

Long-term Stewardship Implementation Plan Guidance

Draft

January 18, 2001

Note to Reviewers:

This document provides a first draft of a guidance document designed to provide assistance in developing site-specific long-term stewardship implementation plans. It begins to lay out the framework for developing an LTS Implementation strategy, and provides a first cut at a possible model table of contents for site-specific plans. Appendices will provide examples, on-line resources, and other resources identified that will assist in development of the site-specific plans. The guidance is based on materials developed by the Grand Junction Office in support of the LTSM program, and incorporates additional information and components of a plan recommended by many of the recent DOE and stakeholder reports on long-term stewardship. This guidance represents a joint effort between DOE Headquarters and the Field (EM, EH, and GJO). Technical support has been provided by Mactec, Project Performance Corporation (PPC), and ICF Consulting.

We hope that this document provides a basis for discussion and ideas. We fully expect that, based on discussion and results of focus groups, and comment received, this document will undergo significant revisions. In addition, we anticipate that many of you will want to participate in development of portions of this guidance, or will have additional references and/or examples that you believe will be of benefit to others when developing LTS plans. If you have questions or comments on this document, please contact Rich Dailey (EH) at (202) 586-7117, or Jonathan Kang (EM) at (301) 903-7178. We welcome your comments, and look forward to working with you in the future.

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PART I – STRATEGIC PLANNING IN LONG-TERM STEWARDSHIP

1.0 Introduction – Posing the relevant questions

During the past decade, the U.S. Department of Energy (DOE) Environmental Management (EM) Program has made significant progress in addressing the environmental legacy of the Cold War. It has reduced the risks and costs associated with maintaining safe conditions across the DOE complex. In spite of that effort, existing plans and agreements with regulators and affected parties will result in the majority of DOE sites not being cleaned up to the point where they can be released for unrestricted use. Factors such as technical infeasibility, excessive worker risk or environmental damage, programmatic priorities, and costs dictate the extent to which sites are undergoing remediation and the consequent end-states achieved. When EM program projects are completed, most DOE sites will require some level of long-term monitoring and maintenance to ensure protection of human health and the environment from hazards that remain after the cleanup is complete.^{1,2}

1.1 What is Long-Term Stewardship?

Long-term stewardship (LTS) is all activities required to protect human health and the environment from hazards remaining after cleanup is complete. When residues are left in place, risk is managed by preventing exposure pathways from being complete. LTS encompasses those activities necessary to maintain discontinuity in the exposure pathways. Activities include operation, maintenance, and monitoring of physical and institutional controls, information management, and related functions applied to engineered units containing wastes, residually contaminated ground water, surface water bodies and sediments, soils, and stabilized contaminated facilities.

1.2 Why Is LTS Needed?

In light of technological and economic limitations, DOE decision makers, regulators, and stakeholders have made a conscious decision to leave wastes in place for the present at most sites as a part of the selected remedy. Future costs often arise because such a decision carries the responsibility to ensure that the remedies remain effective over the time periods dictated by the length of time the hazards will remain. There is no basis for stating that the remedies put in place now will be reliable for as long as required, unless they are maintained and monitored. Consequently, leaving waste in place has a potential fatal flaw, i.e., if there is no future steward to ensure that the engineered and administrative controls are effective, then the likelihood of failure increases.

¹ *From Cleanup to Stewardship*, a Companion Report to *Accelerating Cleanup: Paths to Closure* and Background Information to Support the Scoping Process Required for the 1990 PEIS Settlement Study, U.S. Department of Energy, Office of Environmental Management, October 1999, [DOE/EM-0466].

² Insert Resources for the Future report; Oak Ridge SSAB report – need references.

1.3 Why develop LTS plans?

Long-term stewardship plans are valuable for a number of reasons: (1) to improve management both before and after cleanup is complete³, (2) to facilitate development of a baseline scope, schedule and cost for LTS, and (3) provide a mechanism for demonstrating DOE accountability to the public by clearly communicating the defined end state, maintenance requirements, performance metrics, monitoring programs, and contingencies in place to address the impact of changes to the end state (e.g., decisions made to change land use or failures arising from reliance on assumed values for uncertain factors that prove to have been in error). In addition, LTS plans (1) encourage strategic planning and identification of cost savings and optimization; (2) provide a mechanism by which future technological advances will be reviewed and implemented as appropriate; (3) serve as a single, consolidated source for knowledge management for future stewards; and (4) for UMTRA sites, an LTSP is required to comply with general licensing requirements. Moreover, long-term stewardship plans present an opportunity to integrate and coordinate all required post-closure elements such as 5-year reviews, site-specific post-closure permit requirements, state-specific closure requirements, long-term monitoring plans, exit strategies, land use controls, air monitoring systems (e.g., methane monitoring at landfills), Nuclear Regulatory Commission (NRC), local requirements, and requirements detailed in other relevant DOE Orders and/or other agreements under one “umbrella”.

1.4 What is the purpose of this guidance?

The purpose of the LTS guidance document is to provide assistance to DOE field staff responsible for developing implementation plans for sites or portions of sites requiring LTS. The guidance provides general principles and identifies key elements for the development and implementation of an LTS plan. The objectives of the guidance are to 1) identify key decisions and questions that will need to be addressed during LTS plan development and, ultimately, LTS implementation; 2) provide a framework under which some of these decisions can be made; 3) identify key elements of an LTS implementation plan, recognizing that each plan will be unique to the site and take into account site-specific conditions, local stakeholder concerns, and requirements resulting from the agreed upon site end state; and 4) serve as a resource with examples, references and considerations to assist authors in developing their plans .

1.5 Who should use this guidance?

If you left or intend to leave sufficient waste or cost appropriations in place to prevent unrestricted use of the resource, this guidance applies to you⁴. LTS plans are applicable to all DOE sites, regardless of a regulatory framework. They are (will be) required for all DOE sites, or portions of sites, where DOE anticipates LTS obligations⁵. However, the structure and roles and responsibilities for how these activities will be conducted will vary depending on the site

³ For the purposes of this guidance, “cleanup” refers to the process of addressing contaminated land, facilities, and materials in accordance with applicable requirements. Cleanup does not imply that all hazards will be removed from the site.

⁴[Planning and Implementing RCRA/CERCLA Closure and Post-Closure Care When Wastes Remain Onsite.](#) [DOE/EH-413-9910]

⁵ May also include those sites for which record keeping is the only requirement; however, those sites are not the focus of this document.

type (e.g., Closure Account site, on-going non-EM mission site). DOE needs to clearly identify who will be responsible for conduct, oversight, and funding of LTS activities.

For closure sites, a primary goal of LTS plans is to identify and consolidate existing planning documents (e.g., land use plans, site baselines, etc.) that provide the relevant information. The goal is not to create a new document, *per se*, but rather to ensure that all LTS elements are addressed to the degree possible and the information is made readily available to stakeholders, stewards, etc.

For ongoing mission sites, (1) EM-related ongoing mission⁶, or (2) non-EM ongoing mission, much of the relevant long-term stewardship information may not yet exist. For sites with an ongoing EM-related mission (or long-term cleanup mission) such as Hanford, Idaho National Engineering and Environmental Laboratory, Savannah River Site, and Oak Ridge National Laboratory, it may be desirable to take an approach similar to the Land Use Control Assurance Plan (LUCAP).⁷ The LUCAP policy directs sites to develop an overarching “umbrella document” that provides as much information as is available at the time and applicable to the whole site (e.g., site missions, steward, maps, etc.). As units, portions, areas, etc., are closed, the site develops a unit/area-specific implementation plan (LUCIP). For example, the Savannah River Site (SRS) has already developed a LUCAP per EPA Region 4 policy.⁸ SRS is currently working to determine the long-term obligations for areas such as the Old Radioactive Waste Burial grounds, and will likely need to develop a Land Use Control Implementation Plan (LUCIP) for that area. As a site gradually closes more and more units/areas, the opportunity exists to re-evaluate the approach and identify opportunities for cost savings and optimization.

At sites with a non-EM on-going mission, e.g., Los Alamos National Laboratory, current DOE policy is that the environmental stewardship function will transfer to the site landlord, Defense Programs.⁹ With this transfer must come a clear understanding of the site end state, the required LTS activities, and the estimated costs of those activities so that budget can be transferred to the landlord, as well as a formal transfer of responsibility, clearly documented in a memorandum of understanding (MOU) that has been developed by both the transferring and receiving programs.

Finally, there are so-called “third party” sites where, upon completion of cleanup activities, DOE does not currently anticipate being responsible for LTS activities. Instead, a non-DOE entity will be responsible for long-term stewardship activities, such as at the Energy Technology Engineering Center. At these sites, DOE is responsible for site cleanup activities but is not the owner of the sites.

⁶ Need to cite Huttoon memorandum on requiring EM sites to develop LTS plans. Date?

⁷ Assuring Land Use Controls at Federal Facilities, April 13, 1998 Memorandum from Jon D. Johnston, Chief Federal Facilities Branch EPA Region 4.

⁸ [Cite SRS LUCAP]

⁹ Long-Term Stewardship Transition to Site Landlord memorandum for all major departmental elements from T.J. Glauthier, December 15, 2000.

1.6 When should LTS planning be initiated?

Ideally, LTS planning should be included from the start of the remediation process¹⁰. However, this has not been the case historically, due to the focus on other missions at the time. Given this circumstance, LTS plans should now be initiated as soon as remedies are envisioned that result in residual onsite contamination. At a minimum, LTS activities must be identified to provide for proper evaluation of cost and effectiveness when evaluating the feasibility of potential remedies.

Regardless of where the LTS responsibility lies, there is a clear need to document decisions, assumptions, the final end state of the site, and the activities necessary to maintain that end state. These items need to be agreed upon and documented by the key decision makers prior to site (or portion of site) closure, so that future stewards have the information necessary to make decisions as changes in site conditions take place. [Will insert dates included in Glauthier memorandum and Huntoon memorandum on LTS Plan development.]

2.0 Framework for LTS Plans– Organizing the necessary activity elements

During stewardship, all activities should be focused on maintaining the remedy in place and gathering the information necessary to make key decisions at the appropriate times. The key decisions can be summarized as:

Is the remedy still protective of human health and the environment?

Is there any indication that protectiveness will not be sufficient in the future?

Are there more reliable or more cost-effective (lower life-cycle cost) means of assuring protectiveness in the future?

Until a site is determined to be restored to unrestricted use (i.e., no controls required), there is a clear need to continue activities designed to manage the residual risk (i.e., keep the exposure pathway broken). LTS plans should provide the framework and path forward necessary to ensure that the Department and future stewards can keep the promise to protect human health and the environment. The LTS plans must provide the basis for conduct of activities addressing the following functions:

Identify roles and responsibilities of parties to make future decisions;

2) Describe all available knowledge and assumptions relevant to making future decisions, as well as identify what is not known;

3) Identify activities necessary to maintain current safeguards pending those decisions;

4) Identify activities necessary to collect missing data and determine how to use monitoring data to support future decisions; and

¹⁰ See EH fact sheet on LTS in the CERCLA process – *to be developed*.

5) Develop interfaces necessary to evaluate the potential to reduce uncertainty or cost through future changes in technology.

These are not new activities. Most sites will be performing these activities at some level (either on a specific unit or site-wide) as documented in 5-year reviews, RCRA post-closure permit requirements, or other consent agreements (e.g., state-specific requirements). Site personnel will be collecting and evaluating data from monitoring systems set up across a site. The purpose of the LTS plan is to articulate the need and approach to conducting these activities, as well as provide a path forward to continually revisit the overall LTS program at a site and evaluate whether the best solution is in place, or whether there are options available that will provide the same level of protectiveness at a lower overall cost to the government.

2.1 Identify Roles and Responsibilities

Essential to effective long-term stewardship is development of an effective core team of decision makers that can work together to identify the path forward for the site¹⁰. This includes a clear delineation of roles and responsibilities, opportunity for and acknowledgement of input from all affected parties (DOE, regulators, and stakeholders), and adequate provision for knowledge management to best prepare future generations for their role in continuing stewardship as needed.

The “core team approach” is a formalized, consensus-based method in which those individuals with decision-making authority plan and make decisions. During plan development, the core team is comprised of DOE, USEPA, and State remedial project managers, who work together to reach agreement on key LTS decisions. During LTS implementation, the core team may change so that it continues to represent the steward at the time and the relevant regulatory oversight authorities. During both phases, the core team works to ensure that all technical support staff and stakeholders are involved and communicating effectively.

Information exchange and communication both internally and externally are a major responsibility of the core team and critical to the success of LTS. All decisions that are made through the core team approach are clearly documented and shared with internal and external stakeholders. The key is that there are no surprises in these documents between the core team, and that stakeholders and technical support staff are kept in the “loop” on key decisions that are being made. This will be particularly true in LTS, as local community governments and stakeholders often have key roles (e.g., making sure that access restrictions and other use restrictions are maintained – in order for them to want to help, they need to understand why it is important).

During plan development, the communication function includes coordinating with DOE personnel responsible for restoration activities as well as critical closure activities (e.g., real property assessment) to ensure that all information necessary to develop the LTS plan is current and that the LTS plan fully encompasses all required activities, such as maintaining deed/access restrictions. The plan itself is intended to communicate to future generations, a particularly important and challenging requirement. Format and content must be such that future stewards

understand the ramifications of changes in site use or monitoring and maintenance activities. During implementation, additional communication will include the mandatory reporting such as five-year review reports, permit modifications or renewals, or other requirements and any interim findings or changes that impact LTS activities or decisions. The plan should provide the framework for this communication.

2.2 Describe Knowledge and Uncertainties Relevant to Making Future Decisions

In order to ensure that future stewards have the information necessary to be able to maintain an effective LTS program, they need to first understand the baseline of site conditions that were agreed upon by decision makers at the time of site closeout. Therefore, the implementation plan must clearly articulate the site end state and the nature of restrictions imposed on potential uses of the site. Without this, it will be difficult for future decision makers to understand potential implications of loss of institutional or engineered controls, or changes in site conditions or land use, let alone to determine when monitoring programs can be revisited to reduce overall long-term costs.

The authors will need to consider the most effective way to communicate this information, based on site-specific conditions. For example, the end state description may warrant discussions for LTS activities at the surface versus sub-surface conditions, depending on the status of the site (e.g., sites where surface contamination has been addressed but groundwater strategy is not yet in place). In addition, depending on the site, this end state description can be provided on a site-wide basis, or a unit-specific basis (e.g., for sites where LTS will be implemented in phases rather than the entire site at one time.) The site end state description also needs to include a discussion of site end state conditions by media type and remedy in place, including groundwater (from pump and treat, MNA, treatment walls, etc), facilities, engineered units (vaults, engineered cells), surface water bodies and sediments, and other media as appropriate (e.g., air, vadose zone).

The key is to find simple, communicative forms and ways of facilitating access to the information, not just providing voluminous data through which others must sort. One such means is through use of tools such as the post-closure conceptual site model (CSM). The CSM can be used to illustrate not only where waste and residual contamination are left in place, but to also show where the administrative and engineered controls are in place to limit potential for exposure¹¹ (i.e., how the exposure pathway has been broken). Other communication tools include decision diagrams and problem statements used by the core team¹² to determine the path forward for the site.

The LTS plan needs to be maintained as a “living document”, i.e., as site conditions change, these changes need to be reflected in the LTS plan. During LTS implementation, the core team needs to agree on when an LTS plan should be updated based on information received, changes

¹¹ For example of post-closure conceptual site model see [Planning and Implementing RCRA/CERCLA Closure and Post-Closure Care When Wastes Remain Onsite](#), [DOE/EH-413-9910], and the *Long-term Stewardship Study*, Draft, Appendix E, October 2000.

¹² For more information on using the core team approach, [Expediting Cleanup Through a Core Team Approach](#), [DOE/EH-413-9911]

in site conditions, and other external factors. Changing formats and mechanisms for knowledge transfer may pose special challenges for updating those portions of the plan. The core team also needs to understand and communicate the impacts of these changes to stakeholders so that if/when site conditions change, the implications are understood ahead of time, rather than being a surprise. The plan should serve as a continual reminder of what the original goal was (i.e., the problem that was being addressed and actions taken to get there), so that stewards can evaluate whether this is being maintained/accomplished.

2.3 Identify Activities to Maintain Safeguards

For all components of the end state, the implementation plan should identify the activities necessary to maintain and gradually improve that end state. This is not intended to repeat all information contained in site closeout reports, etc., but rather to summarize this information in a central location. While the detail should be contained elsewhere, information needs to be easily/readily accessible for future stewards/decision makers.

Most sites will have activities such as barrier maintenance and operation of ground water restoration programs. The LTS implementation plan should identify each of these activities, the rationale for its inclusion, the methods by which it is to be accomplished, and a clear indication of the potential consequences of detection. This aspect of the implementation plan will most closely resemble typical remedial action work plans.

2.4 Identify Activities Necessary to Collect Data

Monitoring is a form of data collection applied to address residual uncertainty associated with the protectiveness of a remedy and the likelihood that it will achieve restoration objectives. Uncertainty is inherent in environmental restoration and arises from a number of sources such as inability to completely characterize heterogeneous media, insufficient long-term experience with remedial action technology, and inability to control future conditions that impact potential land use. Monitoring may encompass collection of data on physical properties such as contaminant concentrations in ground water or observations of activities such as intrusion into areas of restricted access or changes in land use patterns.

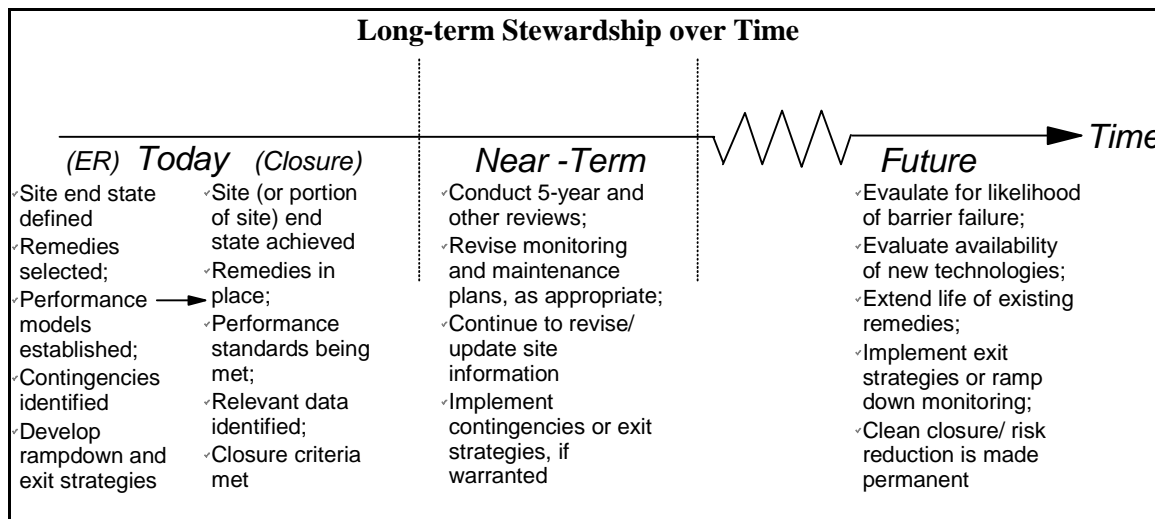
For all monitoring programs, the LTS plan should contain: 1) clearly defined and articulated objectives, 2) descriptions of what data need to be collected and why, and 3) a clearly defined method for interpreting the data, including thresholds at which the future steward determines that a change is required either because the remedy has failed, or the time has come to execute a ramp down or exit strategy¹³. One means of data interpretation is comparison of monitoring results to expectations derived from the performance assessment model. When appropriate, expectations derived from the performance assessment models should be incorporated in the implementation plan to assist future stewards in making decisions

¹³ For information on exit strategies, see [Developing Exit Strategies for Environmental Restoration Projects](#). [DOE/EH-413-0013]

2.5 Develop Interfaces Necessary to Facilitate Improvements in Reliability and Reductions in Life-Cycle Costs

At least in part, the decision to leave wastes in place has been made because of the inability of current technology to remove those wastes in a cost-effective manner. In many cases, that decision has been arrived at with the implicit recognition that technological advances will likely provide much more cost-effective alternatives in the future. In order to take advantage of those developments, future stewards must be prepared to evaluate new alternatives and implement those that will provide clear advantages in the form of increased reliability and/or reduced life-cycle costs.

The re-evaluation of technology has been imbedded in DOE's five-year review plan guidance. Since five-year reviews (and other comparable reviews) are a component of LTS, that function should be clearly identified and the procedures defined in the implementation plan. Similarly, other mechanisms are also in place that embrace the re-evaluation of technologies, including requirements in DOE Order 435.1¹⁴ The re-evaluation should address both active LTS measures and contingency plans identified for implementation should monitoring reveal the remedy has failed or will fail in the future.



2.6 Develop LTS Cost and Schedule Baselines

Once LTS activities have been identified and planned, it is important to determine the schedule on which they will be implemented and the annual cost incurred. These data serve several purposes: (1) Delineate the impact on future stewards if the site is to be transferred to a new landlord organization; (2) Provide input for entry in the IPABS data base; and (3) Establish the baseline against which proposed innovations or technology changes can be compared.

¹⁴ Although not explicit, similar requirements will likely need to be embraced when post-closure permit or other state-specific agreements are renewed

3.0 Use of This Guidance Document

Part II of the guidance document provides an annotated table of contents that can be used as the basis for developing a site-specific LTS Plan. While it is widely recognized that all plans will need to be tailored to the specific needs of the site, local community, and the regulatory community, key components of a plan are listed as headings or sub-headings. There is no “one size fits all” LTS Plan. However, certain elements are likely common enough that some generic guidance is useful. Annotations discuss the purpose of each portion of the plan so that authors are mindful of the intent and potential uses of information in the plan as they prepare it. Part III of the document consists of appendices organized parallel with the table of contents for the LTS Implementation Plan. These appendices are intended to serve as a resource to authors during development of site-specific plans. They include (or will include) examples, references, websites, policy statements, and related matter from which authors can choose and after which they can pattern their own plans.

It is envisioned that authors will take the model table of contents and use it as a starting template to construct a site-specific implementation plan (electronic version available at the Office of LTS website <<http://lts.apps.em.doe.gov>>) Upon reading Part II materials, authors will determine the sections and level of content required for their plan. They can utilize resources in the Appendices as appropriate to help create that content. If sections of the table of content are needed, they can be omitted. Preferably, the authors will leave the section heading in place and insert a brief rationale for why that section is not required. The justification for omission can be just as illuminating to future stewards as information provided in sections that are retained.

PART II: LTS IMPLEMENTATION PLAN TEMPLATE – SUGGESTED MODEL TABLE OF CONTENTS

[Note: As with all of this document, the contents in each section are subject to change following review and input from LTS working groups.]

The first section of Part II presents an annotated outline of the generic table of contents for the LTSP for any site or portion of a site. The annotated version of the table of contents describes the purpose of each section and considerations that should be taken in preparing a site-specific plan. The LTS Plan Template is presented in seven major sections:

- 1.0 Purpose and Scope
- 2.0 Roles and Responsibilities
- 3.0 Site Description and Uncertainties
- 4.0 Operation and Maintenance Activities
- 5.0 Monitoring and Surveillance Activities
- 6.0 Technology Review
- 7.0 Cost and Schedule

Exhibit II-1 presents the generic table of contents for the LTSP for any site or portion of site. It is anticipated that this will be used as a template for development of site-specific plans. Authors are encouraged to use it in its entirety and to insert a brief statement on why specific sections are not applicable to the site for those sections that are not relevant. Those inserts will serve to demonstrate to stakeholders that all potential aspects of the LTSP have been considered.

1.0 Purpose and Scope

This section includes a brief statement of why LTS is required at the site and how the plan should be used to implement LTS activities. General DOE policy or other text can be used. The intent of this section is to clearly define the boundaries to which the plan applies, the breadth of activities it encompasses, and the objectives for the activities it specifies such that stakeholders can see their concerns have been addressed and future stewards can continually compare performance with objectives.

1.1 Objectives

The LTS Plan will state the purpose or objectives of stewardship that will be performed at the site. Stewardship may have several objectives, and these should be clearly stated in the Long-Term Stewardship Plan (LTSP), for example:

To assure regulators and stakeholders that DOE's institutional controls have been identified and are accompanied by redundancy and a commitment to provide stewardship for the site for as long as required, and

To respond to regulatory and other stewardship requirements in a fully compliant manner.

The overarching objectives of LTS are common to most sites and can be drawn from LTS reports and example plans such as those provided or referenced in Appendix A. Content should be consistent with programmatic definitions of LTS and Departmental policies. Other objectives may apply at specific sites.

1.2 Scope

The LTSP should assist site personnel and subsequent land/facilities managers by listing the land parcels and activities that will be required to meet the objectives (i.e., delineate the scope of the plan). In addition to describing the physical entity to which the LTSP applies, the scope includes identification of the measures DOE will undertake to ensure institutional control of that entity: inspect, maintain, and repair engineered containment systems, monitor wells, and other as-built features; monitor environmental indicators; respond to public inquiries; provide reports; and maintain site records. Employee health monitoring and retirement benefits may be considered part of stewardship obligations at some sites but are not addressed in this document.

Ideally, the scope portion of this Section will be organized parallel to the organization of the plan i.e., it will describe the site or parcels addressed by the plan and summarize the elements and activities associated with institutional controls, those related to operation and maintenance of barriers, and those related to monitoring and surveillance in the sequence in which those elements and activities are introduced in the LTSP. When the plan addresses a portion of a site, the scope statement should identify the relationship to any other plans such as that in which all plans for individual parcels are integrated across the site. Similarly, if the plan is for the integrated site, the scope statement should identify all of the parcels that are subsumed and for which there may be individual implementation plans.

Each key component of the institutional controls, physical barriers and monitoring and surveillance activities should be identified so that the reader has a capsule look at the entirety of the plan scope. Details should be provided in subsequent sections of the plan.

1.2.1 Physical Boundaries To Which Plan Applies

This section should contain a description of the physical boundaries that constitute the parcel or site to which the LTSP applies. Graphical support in the form of maps is helpful. If the site being addressed is part of a larger facility or parcel, the relationship of the two should be delineated. GIS or survey benchmark reference points would be a practical piece of information to include.

1.2.2 Institutional Controls

This section should summarize nature and extent of institutional controls encompassed in the LTSP.

1.2.3 Physical Barriers

This section should summarize nature and extent of physical controls encompassed in the LTSP.

1.2.4 Monitoring and Surveillance Activities

This section should summarize nature and extent of monitoring and surveillance activities encompassed in the LTSP.

2.0 Roles and Responsibilities

This section should identify key positions and describe their roles and responsibilities. The intent is to clearly demonstrate that all activities have been assigned and that there is an entity responsible for each activity. This will assist stakeholders in identifying who to contact when they have concerns and will reiterate responsibilities when stewards or other parties change in the future. While the Department endorses a core team concept, the plan should include clear identification of who the steward is and how that position relates to regulators (who often comprise the other positions on the core team), landlords and stakeholders. In addition, when other parties will carry responsibility for performance of specific LTS activities, those parties and the scope of their responsibilities must be clearly identified (e.g., when the landlord will maintain use restrictions or regulators will monitor resource use). Important elements will include assignment of responsibilities and discussion of the communication requirements, especially the knowledge management activities associated with archiving information for future generations.

2.1 Roles

This section should identify the various roles required by the LTS.

2.1.1 Steward

This section should designate who the steward organization is and how that role might change with changes in ownership or mission.

2.1.2 Core Team

This section should identify the organizations on the core team or decision making body represented by the steward and the cognizant regulatory authorities.

2.1.3 Regulatory Lead and Oversight

This section should identify the lead regulatory authority and participating oversight agencies.

2.1.4 Delegated Parties

This section should identify any and every party delegated responsibility for some element of LTS activity (e.g., land use restriction enforcement if delegated to the local government).

2.2 Responsibilities

This section should describe the responsibilities of each party identified under Section 2.1 as having a role in the LTSP.

2.2.1 Emergency Notification

This section should indicate who is responsible for emergency notification and how that will be executed.

2.2.2 Reporting/Five-Year Reviews

This section should indicate who is responsible for each reporting activity including conduct and documentation of the five-year reviews.

2.2.3 Operation and Maintenance

This section should indicate who is responsible for operation and maintenance functions.

2.2.4 Monitoring and Surveillance

This section should indicate who is responsible for conduct of each monitoring and surveillance activity.

2.2.5 Records

This section should identify the types of records to be maintained and who is responsible for creating, managing and maintaining them.

Multiple sets?

Essential records of waste locations?

2.2.6 Final Site Disposition

This section should indicate who is responsible for determining final site disposition and what that entails.

2.2.7 Documentation Requirements

This section should address what needs to be documented, how documentation will be performed and who is responsible for those activities.

2.2.8 Information Management

This section should identify who is responsible for information management and how that will be accomplished. This activity will be subject to significant change in the near future as current requirements are reviewed in light of the needs imposed by potentially indefinite periods of stewardship not contemplated in current requirements. As a consequence, this portion of the plan may be subject to significant revision as new guidelines and policies are formulated.

2.2.8.1 Site characteristics and setting

This section should identify the type and level of information on site characteristics and setting that will be generated and archived in the permanent repository.

2.2.8.2 The location and nature of residual hazards

This section should identify the type and level of information on site location and nature of hazards that will be generated and archived in the permanent repository.

2.2.8.3 Engineered and institutional controls used to manage residual hazards

This section should identify the type and level of information on engineered and institutional controls that will be generated and archived in the permanent repository.

2.2.8.4 Past and present operations and activities that generated hazards and left residual hazards

This section should identify the type and level of information on past and present operations and activities that will be generated and archived in the permanent repository.

2.2.8.5 The regulatory and institutional framework for long-term stewardship.

This section should identify the type and level of information on the regulatory and institutional framework that will be generated and archived in the permanent repository.

2.2.8.6 Identifying Long-term Stewardship Information

This section should identify the type and level of additional information that will be generated and archived in the permanent repository.

2.2.8.7 Information Preservation

This section should identify the methods and means by which information will be preserved.

2.2.8.9 Storage and Archiving LTS Records

This section should describe how and where records will be stored.

2.2.8.9 Records Retrieval

This section should describe how record access will be enabled and the measures necessary to ensure compatibility with information hardware and software at future dates in light of continual technological advances in information management.

2.2.8.10 Public Access Systems

This section should identify the means by which the public will be afforded access to records.

2.2.9 Oversight Responsibilities

This section should indicate how internal and external oversight will be performed.

2.2.9.1 Internal Policies and Procedures

This section should indicate how internal oversight and review will be conducted. There should be a linkage here with the relevant roles and responsibilities sections and conduct of five-year reviews.

2.2.9.2 External Policies and Procedures

This section should indicate how external oversight and review will be conducted. There should be a linkage here with the relevant roles and responsibilities sections and conduct of five-year reviews.

2.2.10 Public Participation

As stewardship is the final phase of the environmental restoration process for many sites, so too should its public participation program be a natural extension of the existing public participation program. However, modifications may be appropriate to accommodate stakeholder anxiety over stewardship and changes in the pace of activities.

2.2.10.1 Roles and Responsibilities

This section should identify the roles and responsibilities associated with conduct of public participation activities.

2.2.10.2 Public Information Plan

This section should describe the plans for disseminating information to the public and receiving input from stakeholders. The public participation program is an extension of existing efforts under the environmental restoration program and should be designed from that foundation.

Additional resources and discussion relative to preparation of the Roles and Responsibilities section of the LTSP are provided in Part III, Appendix B.

3.0 Site Description and Uncertainties

This section should include all information about the site history and end state relevant to determining the importance of LTS activities and evaluating the feasibility of maintaining protectiveness with proposed changes in site use. Subsections include:

3.1 Site History

The history of a site is always of interest; but it may be critically important if additional contamination is ever detected, if contamination discovered outside the site in a way that implicates the site, or if the regulatory environment should change. This section of the LTSP summarizes the history of the site in terms of previous occupation and use. Information on previous occupants and their operations can be important to future site personnel as the corporate memory is progressively lost. Hence, this section of the LTSP should be written to preserve important aspects of corporate memory that may prove helpful in understanding the types of contaminants that may be present and how they got there.

3.1.1 Former occupants or operators

This section should identify former occupants and operators as a means of helping future stewards better understand the range of possible values for unknown parameters and other uncertainties.

3.1.2 Years of operation

This section should indicate when operations were conducted such that questions about other co-contaminants or other factors that might affect future uses can be put in context relative to historical use of specific chemicals and/or practices that would have impacted releases.

3.1.3 Inputs, processes, and products

This section should identify the processes and products that were employed at the site as a means of assisting future stewards in better understanding uncertainties.

3.1.4 Waste materials and contaminants produced

This section should identify the waste materials and contaminants that were employed at the site as a means of assisting future stewards in better understanding uncertainties.

3.1.5 How the site was designated for remedial action.

This section should describe the process by which the site was designated for remedial action to assist stewards in recognizing the limitations of prior work.

3.2 Site Location and Legal Description

The purpose of this section is to provide future landlords/stewards with a description of the property that will allow them to manage stewardship despite changing conditions. For example, the GIS location and maps are important to define the site boundaries in case the current method of identifying the boundary (e.g., fence, wall, rivers, trees) no longer are available to provide reference. The geologic setting is important to understand potential mobility of the contaminants. A description of the groundwater and climatic conditions are important for judging whether conditions have changed, and if they have, whether these changes could impact protectiveness. Real property definitions are only important if: 1) real property is going to be left on site following closure, 2) if the site is continuing operations after closing or transferring parcels, 3) if DOE needs to maintain utilities or right of way, for example, at a transferred or third party site to perform stewardship requirements (e.g., monitoring), 4) if the real property impacted the design or implementation of the remedies that were selected, or 5) if real property potentially impacted the nature or extent of releases that were the basis for current LTS requirements.

3.2.1 Location of Identifiable Site Portions

This section should describe and present graphically information on where significant features and portions of the site are located. The means of identification must be selected with a clear recognition that many surface, geologic, and anthropogenic features may change over the time periods required for stewardship.

3.2.2 Legal Description

This section should contain a legal description of the site that is consistent with deeds and other documents to which institutional controls may be attached.

3.2.3 Site Access

This section should identify how the site is accessed and what measures are necessary to maintain access throughout the stewardship phase. There is a linkage here with roles and responsibilities to the extent that efforts are needed to keep access provisions current at all times.

3.3 Regulatory Framework

The purpose of this section is to compile in one location all of the regulatory compliance requirements at the site (or portion of the site) that will impact LTS.

3.3.1 Legal Authorities

This section should describe the legal authorities under which environmental restoration was mandated and stewardship is being performed. There is a clear linkage between this section and the relevant portions of the roles and responsibilities section.

3.3.2 Regulatory Requirements

This section should identify all regulatory requirements the LTSP is intended to satisfy.

3.3.3 Other Stewardship Requirements

This section should identify any other requirements the LTSP is intended to satisfy such as agreements with third parties or commitments made during the remedy selection and implementation processes.

3.4 Physical and Baseline Conditions

The purpose of this section is to describe the consensus understanding of the site at the time of closure, including a description of the remaining hazards at the site and how the pathways between the remaining contaminants/hazards and potential receptors have been blocked, controlled, or limited. This information will serve to put risk considerations in context and help stewards evaluate the potential impacts of proposed changes in the future. In many respects this section comprises the starting point for any conceptual models that would be derived in the future relative to pending issues and decision.

3.4.1 Physical Site Conditions

This section should describe the physical site conditions that may impact risk posed by residual contamination. Subsequent sections address aspects specific to portions of the site for which the LTSP may be specifically written.

3.4.1.1 Regional setting

This section should describe the physical features of the region surrounding the site that will affect how contaminants may be released and transported to receptors.

3.4.1.2 Demography

This section should describe the nature and density of potential receptors.

3.4.1.3 Land use

This section should identify current land uses in the context of how those uses define the likely scenarios by which receptors could be exposed to site contaminants.

3.4.1.4 Elevation and topography

This section should describe elevation and topographic features that would impact contaminant fate and transport and/or the feasibility of LTS activities.

3.4.1.5 Climate and weather

This section should describe climate and weather characteristics that might impact contaminant fate and transport and/or the feasibility of LTS activities.

3.4.1.6 Geologic setting.

This section should describe geologic characteristics that might impact contaminant fate and transport and/or the feasibility of LTS activities.

3.4.1.7 Current Uses

This section should identify current site uses in the context of how those uses define the likely worker or visitor exposure scenarios and/or the logistical implications to LTS activities.

3.4.1.8 Potential Uses

This section should identify potential future site uses in the context of how those uses define the likely scenarios by which receptors could be exposed to site contaminants and/or their implications to LTS activities.

3.4.1.9 Liens and Other Property Rights

This section should identify any and all encumbrances that impact site use or pose restrictions on LTS activities.

3.4.2 Conditions of Specific Site Portions

This section should address characteristics of specific parcels within a site for which the LTSP is specifically designed.

3.4.2.1 Location

This section should provide precise information on the location of the parcel of interest. Geographic positioning satellite coordinates or similar universal system location identifiers would be optimal to insure portability well into the future. If

coordinates are tied to a site-specific system, a clear reference point that will survive the stewardship timeframe is needed.

3.4.2.2 Current Uses

This section should describe the current uses for the portion of interest.

3.4.2.3 Potential Uses

This section should describe the potential future uses for the portion of interest.

3.4.2.4 Liens and Other Property Rights

This section should identify any and all encumbrances that impact use or pose restrictions on LTS activities for the portion or parcel of interest.

3.5 Off-site Locations and Characteristics

This section should address characteristics of off-site locations impacted by the LTSP.

3.5.1 Location

This section should provide precise information on the location of off-site properties that are impacted by the LTSP.

3.5.2 Current Uses

This section should provide precise information on the current uses of off-site properties that are impacted by the LTSP.

3.5.3 Potential Future Uses

This section should provide precise information on the potential future uses of off-site properties that are impacted by the LTSP.

3.5.4 Liens and Other Property Rights

This section should identify any and all encumbrances that impact use or pose restrictions on LTS activities for off-site properties impacted by the LTSP.

3.6 End State Objective

The purpose of this section is to document the assumptions on which the LTS plan is predicated relative to future use and exposure scenarios. This will allow future stewards to evaluate proposed changes and determine if they are sufficiently different to warrant additional measures to ensure protectiveness. Both mission and site use are relevant.

3.6.1 Site Portion End States, as applicable

This section should describe the end state for portions of the site addressed by the LTSP. The end state must be consistent with overall site end state descriptions and mission.

3.6.2 Site Mission

This section should describe the site mission relative to aspects that would impact the effectiveness of LTS and or potential exposure pathways.

3.7 Remedial Actions

The purpose of this section is to describe actions taken relative to site contaminants, thus indicating how risk has been managed and what implications may be put to future monitoring results. The discussion should embrace all actions taken, not just those resulting in stewardship requirements. Hence, removals, interim actions and complementary remedial actions would all be addressed.

3.7.1 Site Portion Remedial Actions

This section should describe the remedial actions taken at the portion or parcel of interest.

3.7.2 As-Builts

This section should document the as-builts for all remedial actions taken in the parcel or portion being addressed by the LTSP.

3.8 Records Disposition

The purpose of this section is to indicate where more detailed records are located should they be needed to resolve issues arising during stewardship.

3.9 Assumptions and Uncertainty Management

The purpose of this section is to explicitly identify that which is not known or understood so that monitoring data can be properly evaluated and contingency plans maintained where appropriate.

3.10 Site Conceptual Model

The purpose of this section is to provide a synoptic look that demonstrates how all pathways have been terminated and the level of redundancy in those actions such that future stewards can understand the implications of perceived failures and/or proposed changes. The model should clearly reflect uncertainties and assumptions as outlined in the previous section, thus

alerting future stewards to those elements of the model and remedy that may be in error due to uncertainties.

3.11 Relationship to Other Site Documents

The content of this section should be condensed to a form that provides a representative picture of the site without burdening the reader with detailed results of site characterization activities. The reader should be given references and/or the location of more detailed information should it be required in the future. The point is not to duplicate the investigation reports. Rather this section should summarize them and point the reader to the more detailed resource if it is required to resolve a future issue.

References, examples, and other resources that may be of use in preparing Section 3.0 of the LTSP are provided in Part III, Appendix C.

4.0 Operation and Maintenance Activities

This section identifies and specifies the activities required to maintain protectiveness through operation and maintenance of physical and institutional barriers that prevent exposure pathways from becoming complete. This section is analogous to a work plan for implementation of a remedial action. It specifies the activity associated with institutional and physical barriers that break the exposure pathway, thus controlling risk to acceptable levels. Subsections include:

4.1 Institutional Controls

This section should describe each institutional control that is being implemented as a part of the remedy and/or other use/access restrictions required to maintain redundant protectiveness.

4.1.1 Site-wide

This section should summarize the institutional controls for the entire site.

4.1.2 Portion-specific

This section should describe the institutional controls related to the parcel or portion of the site addressed by the LTSP.

4.2 Institutional Controls Implementation

This section should describe how the institutional controls will be implemented and maintained. There is a key linkage between this section and roles and responsibilities in Section 2.0.

4.2.1 Site-wide

This section should describe the implementation of site-wide controls.

4.2.2 Portion-specific

This section should describe the implementation of institutional controls at the parcel or portion of the site addressed by the LTSP.

4.3 Operations of Remediation Systems

This section should describe the activities necessary to operate remediation systems such as groundwater pump and treat units.

4.3.1 Methods

This section should describe the methods by which operations will be performed.

4.3.2 Reporting Requirements

This section should identify reporting requirements for operations. There is a linkage here between overall reporting and roles and responsibilities as discussed in Section 2.0.

4.3.3 Health and Safety

This section should describe the health and safety requirements for operations. It may reference a function or site-specific health and safety plan.

4.4 Maintenance of Barriers

This section should describe the activities necessary to maintain barrier systems and physical controls such as caps and permeable treatment walls.

4.4.1 Methods

This section should describe the methods by which maintenance will be performed.

4.4.2 Frequency

This section should identify the frequency for preventative maintenance activities and the triggers for non routine maintenance.

4.4.3 Reporting Requirements

This section should identify reporting requirements for maintenance activities. There is a linkage here between overall reporting and roles and responsibilities as discussed in Section 2.0.

4.5 Emergency Response, Corrective Action, and Contingency Plans

This section should describe how emergency response, corrective actions and contingency plan implementation will be conducted.

4.5.1 Emergency Response

This section should describe the procedure for implementing emergency response when required. There is a linkage between this section and relevant portions of roles and responsibilities in Section 2.0.

4.5.2 Corrective Action

This section should describe the procedure for implementing corrective actions when required. There is a linkage between this section and relevant portions of roles and responsibilities in Section 2.0.

4.5.3 Contingency Plans

This section should describe the contingency plans and actions identified as a part of the existing uncertainty management strategy. Emphasis is placed on those actions that have been identified and the nature and extent of preparation already accomplished to expedite mobilization.

4.6 Health and Safety

This section should summarize the health and safety requirements for all on-site workers.

4.6.1 LTS Workers

This section should summarize the health and safety requirements for workers implementing the LTSP. This will include workers responsible for maintenance and other activities, in addition to those operating remedial action systems as discussed in Section 4.3.3 and conducting monitoring and surveillance as described in Sections 5.1.13 and 5.3.6.

4.6.2 Other On-site Workers (including federal and non-federal tenants)

This section should describe any health and safety requirements for all other site workers not associated with LTS activities such as tenants.

4.7 Land Use Planning/Implementation

This section should address land use planning aspects not specifically addressed as an institutional control in Sections 4.1 and 4.2.

4.7.1 Site/Portion Land Use Maps

This section should provide maps depicting land use and land use restrictions for the site and specific portions or parcels addressed by the LRSP.

4.7.2 Land Use Definitions

This section should define the scope of activities intended within each land use category.

4.7.3 Land Use Policies

This section should present all policies impacting land use at the site and/or portion of the site addressed by the LTSP.

4.7.4 Land Use Management Plan

This section should describe the plan for managing land use at the site.

4.7.5 Natural and Cultural Resources Management Plans

This section should describe the plan for protecting and managing natural and cultural resources within the affected areas. There is an important linkage between this section on Section 2.0 on roles and responsibilities.

4.8 Resource Management and Personnel Training

This section should describe how resources will be managed and personnel will be trained.

4.8.1 Human Resource Requirements

This section should identify the human resource requirements for implementation of the LTSP.

4.8.2 Personnel Needs

This section should describe the personnel needs associated with the human resource requirements.

4.8.3 Skill Requirements

This section should identify the skills required to complete LTSP activities.

4.8.4 Training Requirements

This section should identify training requirements relative to performance of LTSP activities.

4.8.5 Equipment and Materials Estimation

This section should identify equipment and material requirements arising from implementation of the LTSP.

4.8.6 Equipment and Materials Management Policies/Procedures

This section should describe any policies or procedures required to manage equipment and materials.

References, examples, and other resources that may be of use in preparing Section 4.0 of the LTSP are provided in Part III, Appendix D.

5.0 Monitoring and Surveillance Activities

This section identifies and specifies the activities required to evaluate performance. It should include subsections as follows:

5.1 Monitoring Activities

This section should describe the monitoring activities required by the LTSP.

5.1.1 Specific Monitoring Requirements

This section should identify specific monitoring requirements by portion or parcel within and across the site.

5.1.2 Media that will require monitoring

This section should identify the media that must be addressed by each monitoring activity.

5.1.2.1 Ground water

This section should identify the aquifer and spatial extent of ground water to be monitored.

5.1.2.2 Surface Water

This section should identify the water body and spatial extent of surface water to be monitored.

5.1.2.3 Air

This section should identify the height and spatial extent to which air is to be monitored.

5.1.2.4 Biota

This section should identify the nature of species and tissues to be monitored.

5.1.2.5 Soils

This section should identify the depth and spatial extent of soil to be monitored.

5.1.2.6 Engineered Units

This section should identify the structures and surfaces to be monitored.

5.1.3

This section should state the objectives for each monitoring activity. Distinction should be made among detection, performance assessment and ambient monitoring.

5.1.3.1 Detection

This section describes monitoring activities that have the objective of determining that contaminants have escaped containment at a level requiring implementation of contingency

5.1.3.2 Performance Assessment

This section describes monitoring activities that have the objective of providing an indication that the remedy is not performing as anticipated thus suggesting the need to modify performance assessment models, monitoring or operations to achieve better predictability in the future.

5.1.3.3 Ambient Conditions

This section describes monitoring activities with the objective of determining up-gradient baseline conditions for calibration of detection and performance assessment results.

5.1.4 Parameters

This section should identify the parameters to be monitored in each media.

5.1.5 Standards that Apply

This section should identify the standards that will dictate the acceptability of data from each monitoring activity.

5.1.6 Methods of Monitoring

This section should identify the methods to be employed for each monitoring activity.

5.1.7 Locations

This section should identify the locations at which monitoring devices are to be located or where samples are to be taken.

5.1.8 Frequency

This section should identify the frequency at which monitoring is to be conducted.

5.1.9 Duration and Development of Ramp Down and/or Exit Strategy

This section should articulate the exit or ramp down strategy for the monitoring activity. Exit strategies describe the conditions or results necessary to terminate monitoring. Ramp down strategies describe the results or conditions necessary to drop analytes, omit locations, or reduce the frequency of monitoring.

5.1.10 Expectations (Results of Performance Assessment)

The purpose of this section is to provide a metric for interpretation of monitoring results relative to anticipated performance of the remedy. For instance, if a site is capped, how soon are results expected to reflect the break in the pathway and at what point might one assume the cap has failed because monitoring results do not show sufficient response..

5.1.11 Quality Assurance/Quality Control

This section should describe the quality assurance and quality control program for the monitoring activity. This program may be outlined in the decision document or may be an extension of ongoing monitoring activity at the site.

5.1.12 Contingency Plans/Commitment to Intervene if Parameters are Exceeded

While the contingency plan approach is identified in Section 4.5.3, this section indicates the trigger conditions under which it is implemented.

5.1.13 Health and Safety

This section should describe the health and safety requirements for performance of monitoring activities. Requirements should be consistent with overall site health and safety requirements.

5.1.14 Data Interpretation

The purpose of this section is to identify the statistical algorithms that will be applied to monitoring results (e.g., mean, 95 % upper confidence level, etc).

5.1.15 Reporting and Archiving

This section should describe how monitoring results will be reported and archived. As such, it has a significant linkage with Sections 2.2.5, 2.2.7, and 2.2.8.

5.1.16 Threshold Criteria, Contingency Plans

This section should identify the trigger criteria that would require implementation of contingencies. Each trigger should be linked explicitly with the appropriate contingency action as described in Section 4.5.3.

5.2 Portion-specific Monitoring Activities

This section should identify and describe the relevant monitoring activities for individual portions or parcels addressed by the plan. While there may be some redundancy with site-wide descriptions, the former (portion-specific) are needed to show direct linkage between monitoring and specific controls, the latter (site-wide) are important to facilitate optimization among compatible activities (e.g., omission of redundant monitoring between parcels and programs, use of common sample points, etc.).

5.3 Surveillance Activities

This section includes those methods selected to monitor institutional and other land use controls.

5.3.1 Types of Inspection

This section should describe the inspection activities required to monitor institutional controls and some physical barriers such as caps.

5.3.2 Objectives of Inspection Activities

This section should clearly identify the objective(s) for each inspection activity.

5.3.3 Frequency

This section should identify the frequency at which each type of inspection is required.

5.3.4 Qualification of Inspectors

This section should identify the qualifications for personnel performing inspection services.

5.3.5 Procedures

This section should describe the procedures for conduct of type of inspection.

5.3.6 Health and Safety Requirements

This section should describe the health and safety requirements to be observed by inspectors. Requirements should be consistent with those implemented across the site and among all affected parties.

5.3.7 Reporting Requirements

This section should describe all reporting requirements for the results of inspection activities. Content must be consistent with reporting and archiving requirements specified in Sections 2.2.5, 2.2.7, and 2.2.8.

5.3.8 Emergency Response and Corrective Action

This section should identify the linkage between inspection observations and emergency response and/or corrective actions arising from adverse findings with reference to materials provided in Sections 4.5.1 and 4.5.2 of the LTSP.

5.3.9 Quality Assurance

This section should describe the quality assurance program under which inspections will be conducted.

5.4 Portion-specific Surveillance Activities

This section should describe the surveillance activities relative to specific portions of the site addressed by the LTSP. While there may be some redundancy with site-wide descriptions, the former (portion-specific) are needed to show direct linkage between surveillance and specific controls, the latter (site-wide) are important to facilitate optimization among compatible activities (e.g., inspection of units for multiple attributes or in conjunction with other activities requiring on-site presence).

References, examples, and other resources that may be of use in preparing Section 5.0 of the LTSP are provided in Part III, Appendix E.

6.0 Technology Review

This section describes the interfaces maintained to identify and implement technology upgrades that could reduce the life-cycle cost and/or improve reliability. For the most part, these activities will be embedded in the 5-year review (or other comparable) process, but additional mechanisms are needed to convey priorities and input to the science and technology providers. Technology upgrades will constitute the primary means by which stewards can reduce life-cycle cost over the long run. In order to create the best opportunity for that eventuality, stewards will need to continually apprise the science and technology community of their priority needs (i.e., what are the most expensive and least reliable links). At the same time, stewards must maintain means for reviewing new advances as they become available for application to stewardship missions.

6.1 Strategy Evaluation Policy and Procedure

This section should describe the policy and procedures for identifying technology needs, communicating those needs to the science and technology community, and selecting and implementing technologies that fill those needs. Much of this will likely be accomplished through the technology aspects of the five-year review process. However, additional measures may be needed to communicate needs. Low level waste sites have the mechanism for communication through DOE Order 435.1 and the Research and Development interface implemented in response to concerns raised by the Defense Nuclear Facility Safety Board. Additional linkages will emerge from the roadmapping and needs assessment work ongoing at INEEL.

6.2 Research and Development Needs and Activities

This section should identify how technology needs will be identified and communicated to the science and technology community. This could be linked to performance assessment models and results from sensitivity analyses performed with those models.

6.3 Technology Integration/Deployment

This section should describe how new technologies will be integrated into the program when appropriate.

References, examples, and other resources that may be of use in preparing Section 6.0 of the LTSP are provided in Part III, Appendix F.

7.0 Cost and Schedule

This section should contain a summary of schedule and cost items from all previous sections such that overall cost and schedule can be found in a single location. Ideally, costs will be broken down into the work breakdown structure (WBS) elements consistent with IPABS and data bases such as that being operated by NETL.

7.1 Schedule for Long-term Stewardship Activities

This section should provide the integrated schedule for implementation of the LTSP. If the LTSP addresses a portion of a site, schedules should reflect both the portion-specific activities and integration into site-wide activities.

7.2 Cost Estimating, Funding, and Financial Management

This section should provide estimates of cost, identification of funding sources, and the plan for financial management.

7.2.1 Funding sources

This sections should identify where funds will be derived and how they will be allocated.

7.2.2 Financial Management

This section should describe the financial management plan for funds.

7.2.3 Cost Estimation

This section should provide the best estimate of the cost of implementation of the LTSP. While it is customary to use life-cycle cost estimates for DOE programs, it may be difficult to do so for LTS activities. Some activities are assumed to go on indefinitely (e.g., cap maintenance). Others may have finite but indeterminate life times (e.g., operation of pump and treat groundwater remedies. As a consequence, life-cycle cost estimates may be difficult at best to provide and could be quite misleading. As an alternate, sites may want to consider annual costs. The latter require some analysis to determine the periodicity of episodic cost items. For instance, five year reviews are likely to add costs in the year of the review while barrier replacement costs will arise at the time of failure or preventative maintenance based on estimated life. These costs need to be allocated across the time span so they can be converted to equivalent annual costs (e.g., one fifth the five-year review cost would be added to the annual cost estimate).

7.3 Schedule and Cost for Portions of Site

This section should break out cost and schedule for specific portions of the site being addressed by the LTSP.

The NETL WBS and other resources will be provided in Part III, Appendix G.

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2.2.8.3 Engineered and institutional controls used to manage residual hazards

2.2.8.4 Past and present operations and activities that generated hazards and left residual hazards

2.2.8.5 The regulatory and institutional framework for long-term stewardship.

2.2.8.6 Identifying Long-term Stewardship Information

2.2.8.7 Information Preservation

2.2.8.8 Storage and Archiving LTS Records

2.2.8.9 Records Retrieval

2.2.8.10 Public Access Systems

2.2.9 Oversight Responsibilities

- 2.2.9.1 Internal Policies and Procedures
- 2.2.9.2 External Policies and Procedures

2.2.10 Public Participation

- 2.2.10.1 Roles and Responsibilities
- 2.2.10.2 Public Information Plan

3.0 Site Description and Uncertainties

3.1 Site History

- 3.1.1 Former occupants or operators
- 3.1.2 Years of operation
- 3.1.3 Processes and products
- 3.1.4 Waste materials and contaminants produced
- 3.1.5 How the site was designated for remedial action

3.2 Site Location and Legal Description

- 3.2.1 Location of Identifiable Site Portions
- 3.2.2 Legal Description
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3.3 Regulatory Framework

- 3.3.1 Legal Authorities
- 3.3.2 Regulatory Requirements
- 3.3.3 Other Stewardship Requirements

3.4 Physical and Baseline Conditions

3.4.1 Physical Site Conditions

- 3.4.1.1 Regional setting
- 3.4.1.2 Demography
- 3.4.1.3 Land use
- 3.4.1.4 Elevation
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- 3.1.4.7 Current Uses
- 3.1.4.8 Potential Uses
- 3.1.4.9 Liens and Other Property Rights

3.4.2 Conditions of Specific Site Portions

- 3.4.2.1 Location
- 3.4.2.2 Current Uses
- 3.4.2.3 Potential Uses
- 3.4.2.4 Liens and Other Property Rights

3.5 Off-site Locations and Characteristics

- 3.5.1 Location
- 3.5.2 Current Uses
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- 3.5.4 Liens and Other Property Rights

3.6 End State Objective

- 3.6.1 Site Portion End States, as applicable
- 3.6.2 Site Mission

3.7 Remedial Actions

- 3.7.1 Site Portion Remedial Actions
- 3.7.2 As-Builts

- 3.8 Records Disposition
- 3.9 Assumptions and Uncertainty Management
- 3.10 Site Conceptual Model
- 3.11 Relationship to Other Site Documents

4.0 Operation and Maintenance Activities

4.1 Institutional Controls

- 4.1.1 Site-wide
- 4.1.2 Portion-specific

4.2 Institutional Controls Implementation

- 4.2.1 Site-wide
- 4.2.2 Portion-specific

4.3 Operations of Remediation Systems

- 4.3.1 Methods
- 4.3.2 Reporting Requirements
- 4.3.3 Health and Safety

4.4 Maintenance of Barriers

- 4.4.1 Methods
- 4.4.2 Frequency
- 4.4.3 Reporting Requirements

4.5 Emergency Response, Corrective Action, and Contingency Plans

- 4.5.1 Emergency Response
- 4.5.2 Corrective Action
- 4.5.3 Contingency Plans

4.6 Health and Safety

- 4.6.1 LTS Workers
- 4.6.2 Other On-site Workers (including federal and non-federal tenants)

4.7 Land Use Planning/Implementation

- 4.7.1 Site/Portion Land Use Maps
- 4.7.2 Land Use Definitions
- 4.7.3 Land Use Policies
- 4.7.4 Land Use Management Plan
- 4.7.5 Natural and Cultural Resources Management Plans

4.8 Resource Management and Personnel Training

- 4.8.1 Human Resource Requirements
- 4.8.2 Personnel Needs
- 4.8.3 Skill Requirements
- 4.8.4 Training Requirements
- 4.8.5 Equipment and Materials Estimation
- 4.8.6 Equipment and Materials Management Policies/Procedures

5.0 Monitoring and Surveillance Activities

5.1 Monitoring Activities

- 5.1.1 Specific Monitoring Requirements
- 5.1.2 Media that will require monitoring
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 - 5.1.2.2 Surface Water
 - 5.1.2.3 Air
 - 5.1.2.4 Biota
 - 5.1.2.5 Soils
 - 5.1.2.6 Engineered Units

5.1.3 Objectives for Monitoring Program

5.1.3.1 Detection

5.1.3.2 Performance Assessment

5.1.3.3 Ambient Conditions

5.1.4 Parameters

5.1.5 Standards that Apply

5.1.6 Methods of Monitoring

5.1.7 Locations

5.1.8 Frequency

5.1.9 Duration and Development of Ramp Down and/or Exit Strategy

5.1.10 Expectations (Results of Performance Assessment)

5.1.11 Quality Assurance/Quality Control

5.1.12 Contingency Plans/Commitment to Intervene if Parameters are Exceeded

5.1.13 Health and Safety

5.1.14 Data Interpretation

5.1.15 Reporting and Archiving

5.1.16 Threshold Criteria, Contingency Plans

5.2 Portion-specific Monitoring Activities

5.3 Surveillance Activities

5.3.1 Types of Inspection

5.3.2 Objectives of Inspection Activities

5.3.3 Frequency

5.3.4 Qualification of Inspectors

5.3.5 Procedures

5.3.6 Health and Safety Requirements

5.3.7 Reporting Requirements

5.3.8 Emergency Response and Corrective Action

5.3.9 Quality Assurance

5.4 Portion-specific Surveillance Activities

6.0 Technology Review

6.1 Strategy Evaluation Policy and Procedure

6.2 Research and Development Needs and Activities

6.3 Technology Integration/Deployment

7.0 Cost and Schedule

7.1 Schedule for Long-term Stewardship Activities

7.2 Cost Estimating, Funding, and Financial Management

7.2.1 Funding sources

7.2.3 Financial Management

7.2.3 Cost Estimation

7.3 Schedule and Cost for Portions of Site

**PART III – APPENDICES PROVIDING DISCUSSION, RESOURCES, EXAMPLES FOR DEVELOPING
SITE-SPECIFIC LTS PLANS**

Appendix A: Purpose and Scope

1.1 Objectives

Examples of Statements of Purpose and Objectives

(Resources to support preparation of Section 1.1 Purpose and Objectives of the LTSP)

1.2 Scope

Examples of Scope Descriptions

(Resources to support preparation of Section 1.2 Scope of the LTSP)

Parcel Descriptions

Considerations Relative Development of LTSP for Parcels or Portions of Sites

Additional On-Line Resources:

(Will develop)

1.2.1 Physical Boundaries To Which Plan Applies [TBD]

1.2.2 Institutional Controls [TBD]

1.2.3 Physical Barriers [TBD]

1.2.4 Monitoring and Surveillance Activities [TBD]

Appendix B: Roles and Responsibilities

2.1 Roles

2.1.1 Steward

Additional Resources: Reference T.J. Glauthier Memorandum to All Department Elements; Subject Long-term Stewardship Transition to Site Landlord. December 15, 2000

2.1.2 Core Team

Additional On-Line Resources: Expediting Cleanup Through a Core Team Approach. [DOE/EH-413-9911]

2.1.3 Regulatory Lead and Oversight [TBD]

2.1.4 Delegated Parties [TBD]

2.2 Responsibilities

2.2.1 Emergency Notification

Notification by Outside Agencies. If a site is unoccupied by site personnel for long periods of time, it may be advisable to establish agreements with local law enforcement and emergency service agencies for notification in case of disaster, severe storm, or human intrusion (trespassing and vandalism).

The LTSP should include copies of agency agreements and the procedures established with these agencies for notification in case of an emergency.

Agreements with other federal agencies may also be advisable. Additionally, procedures established for site personnel to contact and receive notices and alerts from such agencies as the U.S. Geological Survey National Earthquake Information Service and the National Weather Service may be advisable.

It may be advisable, especially at unoccupied sites, for the LTSP to require that sign(s) be posted with a telephone number that the public can use to inquire about the site or to advise site personnel of problems as they are discovered.

DOE Notifications. The LTSP should list internal DOE notifications and reporting requirements in the event of an emergency situation, unusual occurrence, or off-normal event. This section of the LTSP supports DOE occurrence reporting requirements.

Other notifications that may be required include regulatory agencies, headquarters and other federal agencies, tribal officials, state offices, local law enforcement agencies, news media, and nearby residents.

The procedures associated with these notifications may include advisories or precautions that should be taken – if the precautions can be anticipated ahead of time.

2.2.2 Reporting/Five-Year Reviews

Accountability and reporting requirements for all stewardship activities at the site likely will be necessary.

If reporting is in response to specific regulatory requirements, or is essential to maintain stakeholder involvement, it may be useful to summarize the reporting requirements identified above in a separate section or table in the LTSP. The summary should identify the report, the frequency of the report, and principal addressees. Distribution of reports to local libraries is useful if public interest is widespread.

2.2.3 Operation and Maintenance [TBD]

2.2.4 Monitoring and Surveillance [TBD]

2.2.5 Records

Experience at sites that have been in stewardship for several years shows that records and records management are mission critical for a successful and compliant stewardship.

The LTSP should require that site records be managed and maintained in a permanent site records file in accordance with schedules and procedures established by the National Archives and Records Administration (NARA) and DOE Order 1324.5B. Individual records in this file must be easily accessible and retrievable by site personnel. The LTSP should give the location of the records repository.

Site personnel will depend on the site records file for day-to-day management of the site and to address recurrent technical, legal, and regulatory issues. Information in the permanent site file will be used by site personnel to prepare for site inspections and to evaluate the results of inspections and monitoring. The permanent site file should contain sufficient information, not only for the compliant operation of the site, but to respond to public inquiries.

The following are among the records that should be included in the permanent site records file:

- Site characterization reports,
- NEPA documents,
- Remedial action plan including design elements,
- Construction report, including as-built drawings, maps, and photographs that establish baseline site conditions,
- Historic drawings, maps, and photographs,

- Site inspection reports,
- Maintenance records,
- Ground-water compliance plan,
- Results of ground-water (and other) monitoring,
- Monitor well completion reports,
- Legal site description including easements, rights-of-way, access agreements, deeds, custody agreements, and other property documents,
- RODs and other agreements and decisional documents, and
- LTSP.

2.2.6 Final Site Disposition

The LTSP should clearly identify the parties responsible for determining final disposition and the process by which final disposition will be made. When licenses (e.g., NRC) or permits (e.g., RCRA) are involved, final disposition may be tied to specific obligations and procedures.

2.2.7 Documentation Requirements [TBD]

2.2.8 Information Management

Failures to generate, identify, and preserve critical information may result in unnecessary exposure to residual hazards, delays in desired site re-use or property transfers, and increased long-term stewardship costs. Successful implementation of long-term stewardship will require detailed, accurate information about:

- Site characteristics and setting.
- The location and nature of residual hazards.
- Engineered and institutional controls used to manage residual hazards.
- Past and present operations and activities that generated hazards and left residual hazards.
- The regulatory and institutional framework for long-term stewardship.

The identity of specific information to be preserved and the format in which it is preserved has not been the subject of any formal requirement. Pending such development, plan authors must prepare their own approaches. To that end, this appendix provides

information and requirements on related programs, as well as a reference to a comprehensive report on important considerations.

Managing Data for Long-Term Stewardship (WORKING DRAFT), ICF Kaiser (now known as ICF Consulting), March 1998.

2.2.8.1 Site characteristics and setting [TBD]

2.2.8.2 The location and nature of residual hazards [TBD]

2.2.8.3 Engineered and institutional controls used to manage residual hazards [TBD]

2.2.8.4 Past and present operations and activities that generated hazards and left residual hazards [TBD]

2.2.8.5 The regulatory and institutional framework for long-term stewardship [TBD]

2.2.8.6 Identifying Long-term Stewardship Information

It is likely that most, if not all, long-term stewardship information has been and continues to be generated at the site. The primary task here will be identifying the *subset* of this information that will be needed 20 or more years in the future. For example, future generations are likely to need detailed, accurate maps outlining what activities took place onsite, and where and when they occurred, what resulted. Large, active sites are likely to have thousands of maps that contain some or all of this information. Which maps will be needed for long-term stewardship?

There are no standard, Department-wide criteria or procedures for identifying long-term stewardship information. This section provides general guidelines and advice, but significant effort may be required to complete this task at your site.

2.2.8.7 Information Preservation [TBD]

2.2.8.8 Storage and Archiving LTS Records [TBD]

2.2.8.9 Records Retrieval [TBD]

2.2.8.10 Public Access Systems [TBD]

2.2.9 Oversight Responsibilities

2.2.9.1 Internal Policies and Procedures

Internal Oversight Policies and Procedures

Unit-specific Oversight (e.g., Oversight of Engineered Control Implementation)

System-specific Oversight (e.g., Oversight of Institutional Control System Implementation)

Long-term Stewardship Requirements Oversight (e.g., Oversight of Compliance with External Regulatory Requirements)

Long-term Stewardship Management Systems Oversight

2.2.9.2 External Policies and Procedures

2.2.10 Public Participation

Involve a broad, diverse set of individuals in the process of identifying long-term stewardship information. Consider the following types of individuals:

- **Subject Matter Experts.** These are individuals with substantive technical knowledge in their respective fields. They may be employees or contractors at the site, employees of other federal agencies, or members of local communities. Different sets of subject matter experts would be appropriate for different types of information. For example, subject matter experts for information pertaining to emergency response might include members of local fire and rescue squads, emergency room nurses and physicians, public health officers, and site health and safety officers. Subject matter experts for information pertaining to natural resources might include site natural resource managers, Department of the Interior or EPA scientists, state fish and game biologists, university professors, Tribal scientists, members of conservation organizations, and local hunters/fishermen.
- **Information Management Professionals.** These are individuals with substantive technical knowledge of information management procedures, requirements, and practices. These would include the site Chief Information Officer, site records management personnel, librarians, and historians.
- **Managers** responsible for conducting long-term stewardship activities.
- **Regulators** with regulatory authority for site long-term stewardship activities, including federal, state, local, and Tribal agencies.
- **Members of Site Advisory Boards** such as Site Specific Advisory Boards or Citizen Advisory Boards.
- **State, Local, and Tribal Government Representatives.** Of particular interest are individuals who may require long-term stewardship information to fulfil their responsibilities (e.g., planners, librarians, historians, members of zoning or planning boards, public safety officers, emergency response workers).
- **Members of Minority Communities.** Of particular interest are individuals familiar with lifestyle, language, and other issues that could lead to environmental justice concerns.

2.2.10.1 Roles and Responsibilities [TBD]

2.2.10.2 Public Information Plan [TBD]

Appendix C: Site Description and Uncertainties

The long-term stewardship plan should include a general description of the site and vicinity, including the general characteristics of the site and off site areas that are relevant to long-term stewardship. The general site description should also include, as appropriate, a description of the site portions that are established for the purposes of real property management and long-term stewardship planning and implementation.

3.1 Site History

3.1.1 Former occupants or operators [TBD]

3.1.2 Years of operation [TBD]

3.1.3 Processes and products [TBD]

3.1.4 Waste materials and contaminants produced [TBD]

3.1.5 How the site was designated for remedial action [TBD]

3.2 Site Location and Legal Description

3.2.1 Location of Identifiable Site Portions

The LTSP should contain a map that shows the name and location of the site with respect to cities and towns, highways and roads, political divisions (state and county lines), and physical features such as rivers and streams.

Directions or a road log to the site suitable for first-time visitors should be provided along with narrative instructions for access, if necessary.

The size of the site, in acres or other familiar unit, should be stated in the text of the LTSP or on one of the drawings that accompany the LTSP.

3.2.2 Legal Description

The LTSP should include the legal description of the site. An appendix or attachment may be useful for this purpose. The legal description should note whether rights-of-way or utility easements are present.

For most sites, the legal description will be the surveyor's description as recorded on the title or deed entered at the county courthouse. The legal description should include the township, range, and section (nearest quarter section) or equivalent (e.g., metes and bounds). Legal descriptions may vary from state to state.

Unless the site is on a DOE facility, Indian reservation, or other withdrawn area, the LTSP should identify the type of real estate instrument(s) associated with conveying the site from the public or private domain to DOE. At some sites, custodial agreements, permits, or similar instruments may take the place of title transfers. If so, the agreement should be included in the LTSP, perhaps as an attachment.

Document(s) containing information associated with the real estate transaction should be cited in the LTSP (e.g., book, page, county, state, and date for deeds; *Federal Register*

number and date for transfer of jurisdiction; and agreement number and date of tribal agreements). The LTSP will also name the DOE office where the real estate record for the site is maintained. Copies of key real estate documents should be available to site personnel in an active site records file. (See Section 2.14, Records.)

3.2.3 Site Access

If the site is “landlocked” and not accessible from public roads, the LTSP should include specific information on DOE’s easement or right-of-way for site access, how legal access to the site is established and ensured, and the extent to which the access is permanent and perpetual. The LTSP should include the legal right-of-way or access agreement for sites on private or tribal lands or other withdrawn areas.

From time to time, site personnel may need access to property adjacent to the site. The LTSP should identify owners or points-of-contact for adjoining property and give addresses and telephone numbers so that these persons may be contacted for emergency or routine purposes. Clearly, this portion of the LTSP will require continual updating as property owners and contact s change.

If specific procedures or protocols, such as prior notification to obtain keys, have been established for access to adjacent property, the LTSP should be specific about these procedures.

If Privacy Act requirements preclude the inclusion of this information in a public document like the LTSP, the LTSP should direct site personnel to the location of this information in the site records. (See Section 2.14, Records.)

3.3 Regulatory Framework

The LTSP must identify and evaluate *all* applicable regulations and requirements that apply to DOE’s long-term stewardship of the site. This is to demonstrate that stewardship will be fully compliant. An LTSP that does not achieve this will be deficient.

- The list of regulations and other requirements may include:
- Federal laws, such as AEA, CERCLA, Toxic Substances Control Act (TSCA), NEPA, Safe Drinking Water Act (SDWA), RCRA and UMTRCA,
- Federal environmental regulations and rule making by the U.S. Environmental Protection Agency (EPA) and NRC to implement federal environmental laws,
- Permits and agreements with states, tribes, and perhaps local agencies,
- DOE orders, directives, and best management practices,
- RODs established under CERCLA or NEPA, and similar agreement documents that specify requirements for the site following remediation, and

- Remedial action plans or engineering designs that require stewardship activities as part of the remedy.

Stewardship activities that may be required in response to regulations and other requirements include:

- Formal site inspections (surveillance),
- Maintenance and repair, either regularly scheduled or as needed,
- Five-year follow-ups (under CERCLA),
- Monitoring, most commonly ground-water monitoring,
- Operation of ground-water treatment systems,
- Reports,
- Record keeping, and
- Security.

The LTSP should list the legal, regulatory, or other requirements that will apply at the site; explain why each requirement is applicable to the site, if it is not otherwise evident; identify the stewardship activity required in response to the requirement, and perhaps specify procedures for conducting the activity. This will assure regulators and stakeholders that the LTSP encompasses all requirements, and that DOE is committed to responsible stewardship of the site. The list will also assist site personnel and those at higher levels in the department with appropriate planning, staffing, scheduling, and funding.

If each stewardship activity is clearly tied to a specific requirement or best management practice, this will ensure that the stewardship program is cost effective.

One element of stewardship should not be overlooked: the end of stewardship. An open-ended commitment may create a false expectation. In time, however long, specific stewardship tasks, and even stewardship itself, may end. If the end of stewardship is known, it should be stated in the LTSP. If certain kinds of monitoring are required for a specified period of time, or until certain cleanup objectives are met, that period of time or the objectives should be clearly stated in the LTSP.

If, after certain conditions or objectives are achieved, the site will be released for beneficial use, the LTSP should state this as well as whether the release will be restricted or unrestricted.

The sections of the LTSP that follow describe the site and the stewardship activities that will be performed in response to the requirements identified in this section of the LTSP.

Additional On-Line Resources:

¹[Planning and Implementing RCRA/CERCLA Closure and Post-Closure Care When Wastes Remain Onsite.](#) [DOE/EH-413-9910]

3.3.1 Legal Authorities [TBD]

3.3.2 Regulatory Requirements [TBD]

3.3.3 Other Stewardship Requirements [TBD]

3.4 Physical and Baseline Conditions

The general site description should include a description of the site, site missions (if any other than long-term stewardship,) topographic and geographic features (e.g., groundwater aquifers, surface water bodies), infrastructure (e.g., waste management units, roads, rights of way), cultural and natural resources and other site characteristics relevant to long-term stewardship. The general site description should include maps of the site and vicinity. Site maps may be created in digital formats such that the maps may be easily modified as site conditions evolve.

3.4.1 Physical Site Conditions

3.4.1.1 Regional setting

Regional setting is a brief description of the general geographic and physiographic location of the site.

3.4.1.2 Demography

Demography should be described in terms of current population density around the site and expected changes in population density that future site personnel should expect. If there are demographic concerns, such as unresolved environment justice issues, or the impact of residential development on the need for additional institutional controls, these concerns should be addressed in this section.

3.4.1.3 Land use

Land use surrounding the site should be described. Potential change in land use, if likely, should also be discussed. Changes may include zoning changes from agricultural to residential or commercial use, development of schools or parks, changes in the administration of grazing leases and park lands, or the closing of military bases. Changes in land use over time may affect institutional controls or lead to new stakeholder concerns.

3.4.1.4 Elevation [TBD]

3.4.1.5 Climate and weather

Climate and weather information should include average or mean data for precipitation, temperature, days and depth of frost, and wind direction and speed.

Information on average summer and winter (seasonal) variations will help site personnel evaluate extreme weather or storm events when they occur.

3.4.1.6 Geologic setting

Geologic setting should address the geologic stability of the site with respect to such factors as earthquakes, volcanic events, flooding, swelling soils, or unstable slopes. The detail provided in the LTSP should be proportional to the potential geologic hazard(s). Site characterization documents may be useful source documents if they evaluate future site performance (safety) in terms of geologic factors, or if they argue that certain geologic hazards are unlikely.

If ground water is an issue at the site, the LTSP should describe the subsurface stratigraphy and geologic structure in sufficient detail so that their effect on ground-water movement and the fate of ground-water contamination (plumes) can be easily understood. (See Section 2.11.2, Monitoring: Ground-Water and Surface Monitoring.)

The LTSP should provide a detailed description of baseline (initial) site conditions. This description provides future site personnel with a baseline against which to compare and evaluate changes that will occur over time. Many of these changes, including erosion, settlement, plant encroachment and succession, climatic change, and deterioration of as-built structures, may occur slowly. These changes may go unnoticed unless site personnel can compare a future site condition to the baseline condition that the site was in at the beginning of stewardship.

If baseline conditions are carefully described and documented in the LTSP, these conditions can be used by site personnel to:

- Establish starting points to record trends and measure rates of change over time,
- Identify changes that may have occurred, and
- Evaluate whether the changes warrant maintenance, repairs, or larger scale intervention.

The baseline description of the site may consist of:

- Text descriptions,
- Ground, aerial, and perhaps satellite photographs and images, and
- Maps, plans, cross sections, and as-built drawings.

For sites that have been in stewardship for several years, experience shows that site personnel rely heavily on the baseline information provided in the LTSP. The

baseline conditions section of the LTSP should therefore be carefully prepared and thorough.

Construction completion reports or similar documents, with as-built drawings, will be a useful source for baseline information and may be the basis for this section in the LTSP.

Ground-water conditions may be addressed in this section or in the section in the LTSP on ground-water. If ground-water is a significant issue at the site, the LTSP will no doubt contain a separate section on ground-water where such information as water quality, aquifer classification, hydrology, contamination, and the cleanup strategy are discussed. (See Section 2.11.2, Monitoring; Ground-Water and Surface Water Monitoring.)

3.4.1.7 Current Uses [TBD]

3.4.1.8 Potential Uses [TBD]

3.4.1.9 Liens and Other Property Rights [TBD]

3.4.2 Conditions of Specific Site Portions

The LTSP should identify, as appropriate, site portions for management of long-term stewardship activities, and should include a general description of each portion. Site portions are geographic or functional area management units of a site that are established for the purposes of real property management and long-term stewardship planning and implementation. Small sites or sites that are geographically or functionally homogeneous may not need to have site portions. Such sites may be designated “single-portion” sites. Sites that are large and/or geographically or functionally diverse may have a large number of site portions. In developing site portion descriptions, site managers should consider the site mission (if any) and long-term stewardship activities to be conducted on the site, and the geographic characteristics of the site. A site portion may be specific facility or facilities at the site where a specific site mission or long-term stewardship activity is being conducted (e.g., monitoring and maintenance of a waste disposal cell) or a well-defined geographic area of a site where a specific long-term stewardship activity is being conducted (e.g., monitoring of a groundwater plume or surface water body).

Site managers should be aware that site portions delineated for the purposes of long-term stewardship will not necessarily be the same portions as may have been previously established for other purposes (e.g., CERCLA site remediation waste area groups.) Site areas delineated for the purposes of site cleanup may contain “subareas” that have distinct characteristics or that require distinct long-term stewardship activities. Conversely, site areas where different types of cleanup activities are being conducted may, after cleanup is complete, require similar long-term stewardship activities. It may be appropriate to aggregate or disaggregate previously-defined areas of the site in developing and defining site portions.

However, it may also be the case that site-specific agreements or other drivers require long-term stewardship activities to be conducted in terms of site areas that were

previously delineated for cleanup activities. Therefore, aggregating or disaggregating these previously-delineated areas for the purposes of defining site portions for long-term stewardship may complicate regulatory reporting requirements and regulatory oversight processes for the sites and may not improve the efficiency of site long-term stewardship and real property management. In some circumstances site managers may have to work within the confines of previously-delineated “legacy portions” in defining site portions for the purposes of long-term stewardship.

There may be merit in selecting portions or parcels on the basis of compatibility with portions designated in the NDAA report. Similarly, performance of LTS activities may benefit from a linkage between decision documents and LTS plans i.e., a specific plan corresponding with the property addressed in any individual interim or final decision document.

The current uses, potential future uses, and potential disposition paths for each site portion provide a framework for understanding and managing long-term stewardship activities, a means to describe the transition from cleanup to long-term stewardship at the site and for each portion of the site, provide a means for describing progress toward long-term stewardship goals, and provide a ‘disposition map’ for site real property.

3.4.2.1 Location

The site portion location and general characteristics should be described in the site-wide and portion-specific long-term stewardship plan. This information should include a description of the physical boundaries of the portion, topographic and geographic features (e.g., groundwater aquifers, surface water bodies), infrastructure (e.g., waste management units, roads, rights of way), cultural and natural resources and other site portion characteristics relevant to long-term stewardship. The general site portion description should include maps of the site portion and vicinity. Site portion maps may be created in digital formats such that the maps may be easily modified as site conditions evolve.

3.4.2.2 Current Uses

The site-wide and portion-specific long-term stewardship plan should identify the current use and status of the site portion, including the status of cleanup activities(i.e., cleanup ongoing, cleanup completed) current site mission, if any, and uses of land, water, and other resources on the site portion.

3.4.2.3 Potential Uses

The site-wide and portion-specific long-term stewardship plan should identify the potential future uses of the site portion, including allowable, unallowable and most likely uses of the site portion. Potential future site portion uses should be developed based on evaluation of current and anticipated future site missions, the characteristics of the site portion and conditions of the surrounding area, and the characteristics of local institutions. In the event that a likely future use of a site portion conflicts with current or anticipated future restrictions on site use, land use controls implemented for the site portion may need to be reevaluated.

3.4.2.4 Liens and Other Property Rights

The description of the site portion should identify any liens or other property rights (e.g., mineral rights, treaty rights) for the site portion. Such property rights may obligate DOE or future site owners to conduct, or not conduct, certain activities that may be relevant to long-term stewardship. For example, existing mineral rights for a site portion may conflict with land use restrictions on excavation or use of groundwater. Treaty rights may require DOE to conduct long-term stewardship activities to preserve or maintain natural and cultural resources identified in the treaties, in addition to long-term stewardship activities to manage site portion residual hazards.

3.5 Off-site Locations and Characteristics

For many sites, long-term stewardship activities may not be confined to areas within the site boundary. Sites may be required to conduct environmental monitoring activities outside of the site boundaries, for example, or in some cases may have to implement institutional controls (e.g., restrictions on groundwater use) outside of the site boundaries. Therefore, the site description in the long-term stewardship plan should include a description of areas outside of the site boundary for which long-term stewardship activities are relevant. The description of off site areas should include site and vicinity maps and the general characteristics of the off site areas (e.g., why the off site areas are relevant to long-term stewardship.)

Key offsite areas represent adjacent areas “outside the fence” that may be affected by residual site hazards and that may require long-term stewardship activities. The objective is to promote coordinated land use planning and management on-site and off-site. This section of the long-term stewardship plan should describe the rationale for identifying the off site areas as being relevant to long-term stewardship, the current and potential future uses for each off-site area, and how each area may be affected by residual site hazards and required long-term stewardship activities.

The outline for the description of key off site areas should follow that for the site portion descriptions. Additional information concerning the ownership and control of off site areas and the locations of potentially affected human and ecological receptors should be included in the description of these areas. The description should include a description of institutions (e.g., local planning boards) that oversee or control land use for the off site areas.

3.5.1 Location [TBD]

3.5.2 Current Uses [TBD]

3.5.3 Potential Future Uses [TBD]

3.5.4 Liens and Other Property Rights [TBD]

3.6 End State Objective

3.6.1 Site Portion End States, as applicable

The end state of the site portion should be described in the site-wide and portion-specific long-term stewardship plan. This description may include the Conceptual Site Model (CSM) for long-term stewardship developed for the site portion, as well as other information concerning the end state including descriptions of the locations and characteristics of residual hazards for the site portion. The end state description should include a description of the remedy applied to the site portion, location and characteristics of residual hazards, engineered and institutional controls that are associated with the site remedy, and long-term stewardship activities that are required to be conducted for the site portion. The end state description should also identify the location of receptors potentially affected by the residual hazard and long-term stewardship activities.

3.6.2 Site Mission

This section of the LTSP describes the site at the end of remedial action and the beginning of stewardship in terms of the site mission .

The LTSP should state or define the mission of the site. The mission may consist of site withdrawal, institutional controls, and environmental management activities to the exclusion of other uses of the site. In this case, the only activities onsite will be stewardship or stewardship-related activities; and the only personnel routinely onsite are likely to be DOE and DOE-contractor personnel.

At other sites, the mission may allow other DOE, federal, industrial, brownfield, or open space use of the site concurrently with stewardship. If there will be multiple use of the site, the mission statement should state what uses and activities are planned or permitted, and should include or refer, perhaps by citation of other documents, to the limitations, restrictions, and protocols established for the multiple use. If there is a land use plan for the other uses of the site, the land-use plan should be summarized and cited here. (Final disposition of the site after stewardship is covered in Section 2.11.6.)

3.6.3 Site Portion Remedial Actions [TBD]

3.6.4 As-Built

Information on the as-built condition of the site may exist at length in source documents such as the remedial action plans, NEPA documents, records of decision, site characterization reports, and groundwater or environmental monitoring reports. The information can be summarized in the LTSP, by using drawings, tables, and graphs, as appropriate, with citations of the source documents in case site personnel may require more in-depth information. (See Section 2.14, Records.)

The following can be used to describe as-built site conditions:

- Design and location of permanent survey and boundary monuments and other markers,

- Location of fences, gates, and warning signs for site security and institutional control,
- Land use, surface and ground-water use, and ownership of property surrounding the site,
- Surface features including topographic features, elevations, rivers, streams, and surface waters,
- Proximity of natural and cultural resources (schools, churches, residential areas, parks, and historical sites),
- Delineation of revegetated areas disturbed or reclaimed during remedial action with a description of plant succession that might be expected in these areas,
- Location of monitor wells and sampling locations for surface waters,
- Location of disposal cells and other engineered containment systems, including buried structures and sealed buildings,
- Drainage and erosion control structures,
- Areal extent and depth of remnant contamination in soils, and
- Location and extent of contamination in ground water (plumes).

For sites with disposal cells, buried or other containment structures, the LTSP should provide information on the design and construction of these structures. This information is important because the primary responsibility of site personnel will likely be the long-term protection and performance of these structures. Types of features include:

- Location and three-dimensional size of the structure,
- Plan view,
- Construction materials,
- Cross-sections through the structure to show the internal architecture, and
- Specifications and performance characteristics of key structural elements, such as liners.

For buried and surface impoundments with engineered covers, the LTSP should describe the:

- Design of the impoundment, drainage controls, and other features that may contribute to the long-term performance of the disposal cell,
- Elements of the design that protect against moisture infiltration, leaching (ground-water protection), and radon emission. Each should be identified with their intended function, and
- Compaction densities, settlement measuring devices, frost protection, infiltration barriers, cover drainage structures, and other performance features.

The description of the containment structure should be sufficiently detailed to allow site personnel to understand and evaluate the construction and performance of the structure. The description of the structure should include the rationale and intended function for different parts of the design, as well as the design specifications and performance expectations for each part.

Some sites will incorporate vegetation in the design for erosion control or to manage moisture balance by evapotranspiration. Vegetated covers may require maintenance (irrigation, fertilizer, or mowing). At other sites, plant encroachment in rock or earthen covers may be undesirable and require control. If vegetation maintenance is required to ensure the long-term performance of the containment, the LTSP should state the maintenance requirement clearly. If applicable, the LTSP may identify thresholds when control of vegetation may be necessary.

3.7 Remedial Actions

This section of the LTSP describes the remedial action(s) to clean up, isolate, contain, remove, or otherwise reduce the exposure and risk associated with the contamination.

The LTSP should describe the contamination that caused the remedial action in terms of:

- Location and extent of contamination before remedial action,
- Description of the media (soil, water, biota) affected by remnant contamination,
- List of contaminants identified during site characterization,
- Chemical and radiological characteristics of the contaminants and contaminated materials (including ground water, if applicable), and
- Laws, regulations, ROD's, and agreements that drove the remedial action project. (See Section 2.2, Legal, Regulatory, and Other Stewardship Requirements.)

The LTSP should summarize the remedial action project in terms of :

- The authority under which remediation was accomplished,
- Duration of the remedial action project,

- Objectives and selected approach of the remedial action,
- Methods and technology used during remedial action,
- Accomplishments during remedial action, and
- Cost and other historic aspects of the remedial action project.

This information may be at the summary level in the LTSP with appropriate citation of source documents.

3.8 Records Disposition

[TBD]

3.9 Assumptions and Uncertainty Management

Assumptions (current/future land use, contaminant migration, etc.)
 Uncertainty management matrix

3.10 Site Conceptual Model

May incorporate PA/CA analyses, NEPA analyses, CERCLA Baseline Risk Assessments, etc.

Conceptual Site Models (CSMs) are used during cleanup actions to depict the relationship between existing hazards, environmental transport mechanisms, exposure pathways, and ultimate human and ecological receptors. CSMs can also be used to distinguish between known and unknown site conditions (e.g., the existence of fractured bedrock or preferential pathways for groundwater flow). While CSMs have traditionally been used for individual Operable Units or Areas of Concern, it may be possible to develop a long-term stewardship CSM for broader areas of a site (encompassing multiple Operable Units or Areas of Concern). A long-term stewardship CSM, however, may be difficult to develop or impractical at large, complex sites. Functional equivalents could include management plans specific to particular biological resources, or area management plans.

Long-term stewardship CSMs could be used to illustrate the characteristics of a site and its residual hazards, how hazards have been contained, how exposure pathways have been blocked, and the uncertainties that may affect the performance of engineered and institutional controls. Where significant uncertainties exist, the CSM could identify the range of scenarios that are probable or otherwise indicate the importance of the uncertainties. The resulting model could serve as the basis for evaluating the likelihood and consequences of events such as barrier failures, identifying how stewards can plan to mitigate these events, and predicting the ability of future generations to ensure protectiveness based on improved technology and increased understanding of science. The CSM also could serve as a tool for communicating

with local governments and stakeholders. An example of a long-term stewardship conceptual site model is presented below.

Can insert CSM from PEIS Study and Closure with Waste in place fact sheet.

3.11 Relationship to Other Site Documents

The purpose of this section is to identify key DOE headquarters and site documents, procedures, Orders, requirements, guidance, etc. that relate to long-term stewardship activities. The general intent of the guidance is to reference existing requirements, resources, etc. whenever possible. If these existing documents provide sufficient guidance for a given aspect of long-term stewardship (e.g., public involvement), there is no need to repeat this information in the site long-term stewardship plan. Where existing guidance, etc. meets a portion of long-term stewardship needs, the site long-term stewardship plan need only provide the necessary supplemental information.

Site Operating Plan (includes relationship between long-term stewardship and ongoing or planned site missions, including ‘cleanup’)

Life-cycle Baselines, Life-cycle Asset Management Plans [TBD]

Conceptual Site Models and Uncertainty Plans for Remedies [TBD]

Remedial Decision Documents [TBD]
(CERCLA, RCRA, etc.)

NEPA Documents
(Environmental Impact Statements, Records of Decision)

Administrative Records [TBD]

Land Use Plans
(Comprehensive Land Use Plan [CLUP], Land Use Control Assurance Plan [LUCAP], Land Use Control Implementation Plan [LUCIP])

Remedy Implementation and Maintenance Documents
(e.g., Remedial Effectiveness Report)

Public Involvement and Public Information Plan

Natural and Cultural Resource Management Plan

Contingency Plan and Emergency Response Plan

Integrated Safety Management Plans

Site Closure and Post-closure Plans

Special Site Studies (e.g., modeling, risk assessment)

Site-wide and Portion-specific Cost Estimates and Budget Documents

Appendix D: Operation and Maintenance Activities

4.1 Institutional Controls

Institutional controls are defined in various ways by different agencies. In general, institutional controls comprise the non-engineering measures implemented to control and protect the site to prevent or limit exposure and to assure the long-term effectiveness of the remedial action remedy.

Experience at sites in stewardship status shows that the institutional controls that DOE will implement at the site need to be identified at the beginning of the LTSP. These controls are of as much interest to regulators and stakeholders as to DOE. The LTSP should describe all of the institutional controls that will be in place during stewardship. Institutional controls may be listed or summarized in this section and dealt with in greater detail later in the LTSP.

Institutional control(s) are legal or physical mechanisms that DOE will implement to:

- Limit access to the site,
- Limit use of the site,
- Warn of hazard(s), and
- Protect engineered containment systems from public or natural intrusion.

Institutional controls may include:

- Deed to the property in the name of DOE or the federal government,
- Use restrictions, including zoning or use restrictions on a deed (such as restriction on use of ground water),
- Physical barriers to entry and trespass (fences, gates, warning signs), and
- Inspections, monitoring, and reporting on the effectiveness of the institutional controls. (See Section 2.11, Surveillance Monitoring and Maintenance.)

In extreme cases, where risks are substantial, a security force may be required at the site as an institutional control. Most institutional controls will be passive – with the exception of surveillance and monitoring that ensure the effectiveness of the institutional control.

Additional On-Line Resources:

Institutional Controls and Transfer of Real Property Under CERCLA Section 120(h)(3)(A), (B), or (C) -- Draft Document (June 1999) – in WordPerfect format.
<http://www.epa.gov/swerffrr/doc/Icops-fi.wpd>

Need to insert web site for DOE's IC handbook in EH's web site. Call Elizabeth if you cannot find it.

Use of Institutional Controls in a CERCLA Baseline Risk Assessment - CERCLA Information Brief (EH-231-014/1292) Dec 92.
<http://tis.eh.doe.gov/oepa/guidance/cercla/base.pdf>

Assuring Land Use Controls at Federal Facilities, April 13, 1998 Memorandum from Jon D. Johnston, Chief Federal Facilities Branch EPA Region 4.

4.1.1 Site-wide

Proprietary controls (e.g., easements, deed notices)
Government controls (e.g., zoning, permit programs, deed restrictions)
Advisories (e.g., fish consumption, groundwater consumption)
Access controls (e.g., fences, signs)
Lease agreements (includes other property re-use)

4.1.2 Portion-specific

Proprietary controls (e.g., easements, deed notices)
Government controls (e.g., zoning, permit programs, deed restrictions)
Advisories (e.g., fish consumption, groundwater consumption)
Access controls (e.g., fences, signs)
Lease agreements (includes other property re-use)

4.2 Institutional Controls Implementation

4.2.1 Site-wide

Operation
Surveillance and monitoring
Maintenance and inspection
Long-term effectiveness and permanence evaluation
Reevaluation, refurbishment and replacement

4.2.2 Portion-specific

Operation
Surveillance and monitoring
Maintenance and inspection
Long-term effectiveness and permanence evaluation
Reevaluation, refurbishment and replacement

4.3 Operations of Remediation Systems

(Resources to support preparation of Section 4.3 Operations of Remediation Systems of the LTSP)

4.3.1 Methods [TBD]

4.3.2 Reporting Requirements [TBD]

4.3.3 Health and Safety [TBD]

4.4 Maintenance of Barriers

The LTSP should list maintenance and repair activities that are known or that site personnel should reasonably expect or anticipate. The LTSP should also provide for maintenance that can not be foreseen. Erosion problems may develop years after a site is remediated. Again, consideration of worst-case scenarios may be helpful in preparing this section of the LTSP.

Some maintenance may be necessary on a regularly planned and scheduled basis. At some sites, specific maintenance tasks will be part of the remedial action design and required for the remedy to “work,” e.g., maintenance to ensure the long-term integrity of a containment system.

Other maintenance will be on an as-needed basis. All sites will require maintenance of some kind from time to time.

It may be useful for planning and budgeting to distinguish between infrequent, high-cost maintenance (major repairs) and more frequent low-cost maintenance (fence repair, vandalism, or vegetation control). The timing and frequency of the maintenance, if schedulable, should also be stated in the LTSP.

Maintenance activities, depending on the site, may include:

- Road maintenance,
- Fence, gate, and sign repair or replacement,
- Vegetation control (grass mowing; removal of dead material; control of undesirable plant species, including state-listed noxious weeds),
- Repair or re-installation of monitor wells,
- Repair of deteriorating as-built features (disposal cells, concrete structures, drainage control structures, and survey and boundary monuments),
- Re-surveys to measure settlement,
- Repair or improvements to surface drainage, erosion, or flood control structures,
- Repairs or improvements to mitigate the effect of natural processes that may threaten the safety or security of the site,
- Corrective actions (See Section, Emergency Response and Corrective Actions), and
- Reporting and record-keeping requirements for maintenance.

If certain kinds of maintenance warrant verification or inspection for purposes of licensing or quality control, the LTSP should state the requirement and provide for the acquisition of appropriate certification or reports of inspection.

Some maintenance, e.g., maintenance or repair that may alter an engineered containment system, may require prior authorization or coordination with a regulator. The LTSP should state the requirement and provide specific direction for the authorization and approval process.

Additional On-Line Resources:

Guidance for UMTRA Project Surveillance and Maintenance - Describes the procedures that will be used to verify that UMTRA disposal sites continue to function as designated.
<http://lts.apps.em.doe.gov/reports/pdf/doc69.pdf>

Lessons Learned: Monitoring and Maintenance Experience at Completed Uranium Mill Tailings Sites – http://www.doegjpo.com/programs/ltsm/general/tech_doc/pro-papers/lessons/lessons.html

4.4.1 Methods [TBD]

4.4.2 Frequency [TBD]

4.4.3 Reporting Requirements [TBD]

4.5 Emergency Response, Corrective Action, and Contingency Plans

Depending on the site, it may be necessary for the LTSP to address procedures DOE will follow in response to low probability (rare) but high impact events that may compromise institutional controls, degrade the performance of containment systems, or otherwise lead to new or increased exposures. Since the response is likely to be more than what is usually considered maintenance, a separate section in the LTSP on emergency response and corrective action may be appropriate.

Factors that differentiate between maintenance and emergency response include:

- Cause and magnitude of the problem,
- Immediacy of the threat to public health, safety, or the environment, and
- Suddenness of discovery and urgency to restore the site to a safe condition.

Conditions that may require emergency measures or corrective action include:

- Rupture or dislocation in a containment system (cracks, differential settlement, slope failure, erosion, severe shrinkage, increased radiation),

- Subsidence or displacement of containment or barrier materials caused by a seismic event, mass wasting, soil saturation and liquefaction, differential settlement, or similar event,
- Imminent failure of a containment system due to deterioration of erosion and drainage protection features,
- Seepage from a containment system,
- Flooding or shifting stream channels,
- Human intrusion, including theft and vandalism (on a significant scale), and
- Ground-water degradation.

4.5.1 Emergency Response

Emergency response comprises actions required to respond to problems caused by such problems as earthquake, flood, human intrusion, or failure of engineered containment systems. Perhaps the worst scenario would be exposure or excursion of contaminated materials.

Site personnel may discover the problem, or the public may report the problem, by an emergency service agency, or through remote sensory. Notification may come suddenly and unexpectedly. (See Section, Emergency Notification.)

4.5.2 Corrective Action

Corrective action refers to actions required to correct flaws or failure in the design, specifications, or construction of engineered containment system(s), problems that may lead to leakage, exposure, or excursion of contaminated materials. The failure of an active or passive ground-water restoration project might also require corrective action. Flaws may not be discovered for years after design and construction of the site were thought to be complete. The corrective action may require additional remedial action.

Such rare events are difficult to predict. If emergency responses or corrective actions are possible, the LTSP should provide for these actions. This action will assure regulators and stakeholders that DOE has made reasonable provision for response to “what if” problems.

Regulations or agreements may require notifications and implementation of emergency or corrective actions within a certain period of time following discovery. The LTSP should identify clocks that may apply in these situations.

The LTSP should provide general or specific provision for site personnel to perform corrective action. Corrective action may include inspection and evaluation of the

problem; immediate intervention to control or prevent exposure or excursion; and planning, design, and implementation of measures necessary to restore the site.

The LTSP should identify notification requirements, e.g., occurrence reports, that may be required in event of an unusual or emergency incident.

The LTSP should discuss certification of emergency measures or corrective actions and the reporting requirements for the progress of the actions. For example, the NRC may review the progress reports, which may be appended to the site inspection and/or annual report. After the action is completed, all work is certified by the DOE in accordance with the design specifications. The NRC reviews the certification that the emergency repair or corrective action is acceptable. All reports, data, and documentation generated during the emergency measures or corrective action, including a copy of the certification statement, are retained in the permanent site records file. (See Section, Records.)

Contingency model (or equivalent)
Contingency metrics/monitoring plan
Contingency plan/emergency response plan

4.5.3 Contingency Plans [TBD]

4.6 Health and Safety

Health and safety requirements will be determined for the site based on the risks and exposures at the site. Health and safety requirements may vary widely among stewardship sites.

The LTSP should incorporate the health and safety requirements that apply to the site. If there is a separate health and safety plan, the plan can be attached or cited in the LTSP.

If risks and exposures do not warrant site-specific health and safety requirements, the LTSP should explain this circumstance and explain what general health and safety plan or requirement will govern site operations.

4.6.1 LTS Workers [TBD]

4.6.2 Other On-site Workers (including federal and non-federal tenants) [TBD]

4.7 Land Use Planning/Implementation

DOE's internal operating procedures and directives include planning requirements. Land use planning at DOE sites historically has focused on developing facilities and infrastructure to support DOE missions (including cleanup) often assuming that these missions would continue indefinitely. Until 1994, planning was governed by DOE Order 4320.1b, supplemented by additional planning directed at radiation protection (DOE Order 5400.5), and radioactive waste management (DOE Order 431.5). Planning documents developed prior to 1994 generally did not consider land use patterns in surrounding communities, or the

potential consequences of completing site missions and transferring site lands to other owners.

In 1994, DOE land use planning was re-organized under DOE Order 430.1A, Life Cycle Asset Management (LCAM). LCAM is focused on performance-based management of real property over its entire life-cycle: from planning to acquisition, through operation, decommissioning, and disposition or transfer out of DOE control. LCAM, which is still in effect, provides overall performance requirements, but otherwise allows sites the flexibility to specify their planning process. Although LCAM requires a comprehensive land use planning process with stakeholder involvement, the quality and content of land use plans are left to the discretion of DOE program directors. In 1996, the Department issued DOE Policy 430.1, Land and Facility Use Policy (July 9, 1996), which further addresses life-cycle planning activities for DOE land and facilities. The policy promotes the involvement of the surrounding communities and the integration of missions, ecology, cultural, and social factors in a regional context.

Although LCAM is intended to apply over the entire life-cycle of DOE's management of real property, it has been difficult to develop operational requirements specific to long-term stewardship. For example, the Order does not explicitly identify long-term stewardship as a requirement, or explicitly require development of long-term stewardship plans prior to project design or execution. This guidance document intends to clarify that LCAM and other land use planning functions for DOE sites should incorporate long-term stewardship in a comprehensive and coordinated manner. To improve future project planning documentation and life-cycle cost analyses, DOE should place greater emphasis on identifying and addressing any long-term stewardship activities that are required for the asset. In addition, planning under LCAM should identify long-term stewardship as a performance measure in the facility disposition process.

Land use planning is an inherent part of long-term stewardship for any site for which residual hazards remain after cleanup of the site is completed. The protectiveness of the remedy is dependent upon maintenance of the specific land uses upon which the remedy and the end state are based. A remedy that is considered protective based on an assumption of future industrial land use may not be considered protective if the future land use was to become residential. To this effect, site-wide and long-term stewardship plans should establish and describe policies and procedures for development and implementation of a comprehensive land use plan for the site and for each site portion, incorporating existing land use planning and life-cycle asset management provisions of DOE Orders and guidelines and also incorporating long-term stewardship. The land use plan for the site should identify land use definitions to be applied to site portions, and land use designated for each site portion, and policies and procedures for reviewing requests for changes to the designated land use for the site portion. The "designated" land use for each site portion should be developed based on consideration of current and anticipated future site missions (if any) and the characteristics of the site portion, residual hazards, end state, and associated long-term stewardship activities and land use restrictions required for the site portion.

Land use planning for long-term stewardship includes not only policies and procedures for managing on site lands, but also policies and procedures by which land use planning is coordinated with nearby communities. The land use planning and implementation process should incorporate DOE policies and procedures for planning of new missions (if any are anticipated) and planning of other land uses.

Procedures for implementing the site land use plan should also be established in the site-wide and portion-specific long-term stewardship plan. Implementation procedures should include procedures for conducting surveillance of on site and off site land uses and evaluation of land uses for conformance with the site land use plan. Land uses are anticipated to evolve over time and changes in both on site and off site land uses should be tracked with respect to the allowable land uses identified in the land use plan and long-term stewardship plan. Threshold criteria should be established to indicate whether on site or off site land uses are trending towards nonconformance with the requirements of the plan, and identify corrective action measures to be taken in the event that eventual nonconformance is anticipated based on land use trends analysis. Such trends may indicate that land use controls put in place as part of a remedy are not being implemented effectively. Land use plan implementation procedures should also include procedures for evaluating requests for changes to existing land uses, including coordination of on site and off site planning authorities. Requests for changes to existing land uses should be evaluated with respect to the land use assumptions upon which the remedy and end state for the site portion are based. Proposed changes in land use should be consistent with remedy land use assumptions and long-term stewardship requirements for the remedy. Changes in land use may otherwise require changes to the remedy and associated long-term stewardship requirements.

The land use management plan and land use management policies and procedures that are established and incorporated into the site-wide and portion-specific long-term stewardship plan should be reviewed periodically to assess whether the land use management plan and policies and procedures need to be modified to respond to any changes in site conditions. Land use management policies and procedures may need to be revised based on changes in site missions, site portion end state goals, statutory or regulatory requirements for real property management, stakeholder interests, etc. The long-term stewardship plan should establish procedures and schedules for the review of land use management policies and procedures for the site.

4.7.1 Site/Portion Land Use Maps

Allowable and anticipated land uses for each site portion should be identified in the site-wide and portion-specific long-term stewardship plan. Land uses for site portions may be designated in land use maps depicting land use for each site portion and for relevant off site areas. Land use maps may be created in digital formats such that the maps may be easily modified as site portion conditions evolve. Land use definitions (see below) should be depicted on the site portion land use maps.

4.7.2 Land Use Definitions

The long-term stewardship plan should establish a consistent set of land use definitions to be applied throughout the site and to each site portion. Land use definitions should be

developed such that potential changes in land use may be evaluated against a consistent set of definitions. For example, if land use for a particular site portion is restricted to “industrial use” the site-wide and portion-specific long-term stewardship plan should include a definition of what specific uses of the site portion would conform to “industrial use” and which uses would not. An “industrial” facility that also included an on site day care center for use by facility employees and their families may not be considered “industrial” use for the purposes of comparison with land use restrictions for the site portion. The long-term stewardship plan should also include definitions of terms related to land use plan implementation.

4.7.3 Land Use Policies

The long-term stewardship plan should establish policies that direct the management of land use at the site. These policies should establish goals and objectives for land use management that are in accordance with existing DOE policies and requirements, and should ideally be developed in consultation with regulatory agencies, stakeholder organizations, Tribal governments (if any) and local land use planning organizations. Specific policies may address goals and objectives for implementation of current and anticipated site missions (if any,) economic development, and protection of natural and cultural resources. Land use policies should be developed within the context of the long-term stewardship requirements for the site portions, and should be consistent with and support such requirements. This means that land use policies for the site and site portions should be consistent with land use restrictions and institutional control requirements established to maintain remedy protectiveness.

4.7.5 Land Use Management Plan

The long-term stewardship plan should establish procedures to be used in conducting land use planning for the site. Ideally, the land use planning process for the site would be coordinated with land use planning procedures implemented by local planning organizations. The long-term stewardship plan should identify procedures to be used in developing the site land use plan and identify the organizational structure within which site land use planning site will be conducted and the relationships between on site and off site planning organizations. Land use planning procedures should address planning of new site missions (if any,) including Life Cycle Asset Management, National Environmental Policy Act, and other requirements applicable to the site, as well as planning for other uses of the site portions.

Additional On-Line Resources:

Effects of Future Land Use Assumptions On Environmental Restoration Decision Making - RCRA/CERCLA Information Brief (DOE/EH-413/9810) Jul 98.
<http://tis.eh.doe.gov/oepa/guidance/cercla/landuse.pdf>

Cross-Cut Guidance on Environmental Regulations for DOE Real Property Transfers - United States Government Memorandum (DOE/EH-413/9712) Oct 97.
<http://homer.ornl.gov/oepa/guidance/listsubdocs.cfm?ID=150&Home=TIS>

Natural and Cultural Resources Management Plans

Natural and cultural resource management will be an integral part of long-term stewardship for sites having such resources. Federal government entities are required to manage natural and cultural resources in accordance with Executive Orders, statutes, regulations, and treaties. Sites having natural or cultural resources will generally have developed natural and cultural resource management plans, and these should be incorporated as elements of the site-wide and portion-specific long-term stewardship plan and the land use management plan for the site.

4.8 Resource Management and Personnel Training

A key component to effective long-term stewardship is the availability of staff who have the appropriate skill mix and are properly trained in the activities that will be need to be conducted. In addition, ensuring that the right equipment will be available when needed and that the right technologies are deployed in a timely manner are also critical elements of a sound long-term stewardship program. Many of these activities are already an integral part of DOE's environmental program and have been addressed through human resource planning and training requirements and equipment procurement and management procedures. However, many of the activities required for long-term stewardship will be significantly different from activities conducted during facility operations or during the cleanup period. Therefore, current procedures and policies need to be closely examined and modified as appropriate to account for the specific needs of long-term stewardship. The remainder of this chapter will address the specific factors to consider related to: human resource requirements, i.e., how many personnel are required and what is the appropriate skill mix; personnel training requirements for long-term stewardship; equipment and materials; and technology needs, including the application of new technologies as they become available over the long-term.

4.8.1 Human Resource Requirements

As sites move from the cleanup phase to long-term stewardship, there will be a shift in the number of personnel required to conduct the necessary activities as well as a change in the types of responsibilities, and thus the specific skills required. Each of these is discussed briefly below.

4.8.2 Personnel Needs

As discussed in the previous chapters, long-term stewardship will involve an extensive and wide range of activities that many only be required on an intermittent basis. In addition, the types of staff and skill mix required will be a very site-specific decision, depending on factors such as the final remedy selected, site location, and future land use. It therefore is important to consider very carefully the full range of activities that will be required for long term stewardship in both estimating the number of personnel required to conduct these activities and in developing a strategy for procuring these staff. For example, some activities may most effectively be conducted by a minimum number of full-time staff while others may be more appropriately outsourced. A detailed personnel plan, organized according to the four types of long term stewardship work described in previous chapters (routine repetitive services, short-term capital construction projects,

special studies or analyses, and long-term institutional knowledge management tasks) should be prepared to identify personnel needs at the site.

For sites with ongoing missions, it may be possible to integrate some long-term stewardship functions with existing functions at the site, e.g., routine maintenance, inspections. In this case, strategies for projecting hiring needs and procedures for hiring staff can be expanded to include the additional needs associated with long-term stewardship. Even at locations where there is an ongoing mission at the site, it will be important to examine the number of additional personnel required to adequately conduct the activities described in the previous chapters of this document. Moreover, it will be important to carefully consider the skill mix required for long term stewardship (see below) to ensure that the right skill levels, in addition to the right number of people are available.

Finally, it is important to recognize that long-term stewardship personnel needs could vary significantly over time depending on changes in facility conditions. For example, changes in the engineered controls (e.g., degradation of the cap) or change in land use patterns could change the frequency of monitoring, needs for inspections, etc. Also, if changes in the ongoing mission or in business practices (e.g., site is run by an integrating contractor rather than an O&M contractor, extensive downsizing of the labor force is exercised), the implications for long-term stewardship need to be addressed. Therefore, human resource needs will need to be carefully reevaluated frequently.

At sites where there is no ongoing mission, the human resource issue is obviously more acute because it will not be possible to draw on the personnel pool available at the site. For example, maintenance staff responsible for routine inspections and maintenance of site infrastructure will not be available to conduct inspections of monitoring equipment, and other active and passive engineering control mechanisms, such as caps or waste vaults or more mundane facility structures, such as fencing and warning signs. In these situations, determining which of these functions can be most effectively conducted by a minimum number of full time staff and what level of resources will be required to conduct other activities will be required. This is an especially sensitive issue for emergency situations, particularly for sites in remote locations, where there is unlikely to be a ready source of labor to draw upon.

4.8.3 Skill Requirements

The skill sets required to conduct long term stewardship will, in many cases, be quite different from the skills required during operations or during cleanup. As discussed in the previous chapters, long term stewardship involves a diverse set of requirements, ranging from engineering activities and routine maintenance to studies and analyses, knowledge management, and "softer" skill sets such as public involvement and hazard communication. In addition, the skills required at any particular time can vary significantly depending on changing conditions at the site. For example, a rupture in a landfill cap will require skills in hazard analysis, engineering design, as well as additional capabilities for increased monitoring and maintenance. A change in land use patterns, on

the other, could necessitate an increase in staff with expertise related to risk communication, facilitation, and stakeholder management.

In addition to these specific skill sets that are directly linked with specific long-term stewardship, DOE also needs to ensure the availability of staff with the capability to identify, plan for, and respond to potential changes in site conditions and possible failures of engineered or institutional controls. Therefore, there is a need for staff who can both (1) identify and rapidly respond to actual or threatened failures of controls, and (2) recognize and respond to more gradual changes in regulations, site conditions, cultural values, surrounding land use, etc. to ensure the continued protectiveness of remedies.

Another important issue to consider is the availability of funds for staff. In light of reduced budgets, especially for sites with reduced or no ongoing missions, there will be an increased emphasis on keeping staff to a minimum. Therefore, existing staff will need to perform multiple functions. Therefore, a detailed skills matrix that maps required activities against the necessary skill sets is an important part of long-term stewardship planning.

4.8.4 Training Requirements

(to be added; key points to be addressed noted below)

Importance of training – training will be key to preserving knowledge and ensuring the continued institutional memory of what has occurred at the site, what LTS requirements are, unique aspects of the site, cultural issues, etc. Training is essential to addressing many of the intergenerational issues inherent to LTS. Training also very important because people will be required to conduct multiple functions so need to have a very broad range of knowledge and competencies.

Staff need a range of training, ranging from basic env. training to specialized training specific to the site LTS needs ranging from the engineered controls issues to the institutional and cultural issues. Training needs to be an ongoing program to address turnover in staff, diversity of activities and changes over time in the activities required (e.g., change in land use may result in different training needs, changes in monitoring).

Examples of the range of training that will be required (to be elaborated/clarified):

- Overview of environmental requirements
- Long-term stewardship overview
- Self-assessment training
- Maintenance
- Land use management

- Information management
- Facilitation/stakeholder management
- Risk communication
- Hazard analysis

Also important to incorporate a systems approach into training so that staff learn to understand how the different aspects of LTS are linked; e.g., the affect that a change in land use has on the types of activities that are required; the implications of a breach in the landfill cap on the need for additional stakeholder involvement, possible changes in land use, etc

Lots of training already available; also a lot of manuals, procedures, information on best practices, etc. LTS should be integrated into existing programs as available. Need a training plan that addresses how these staff will receive the required training. In many cases, may just be incorporated into existing training with certain modifications. Training plan needs to address certification provisions, annual refresher courses.

4.8.5 Equipment and Materials Estimation

DOE has many processes and procedures in place for estimating equipment and materials that will be required during operations and during cleanup. Many of these same techniques and data sources can be used to estimate equipment and materials required for long term stewardship, e.g., manufacturers' information on equipment life, maintenance manuals, etc. However, unlike operating sites or sites undergoing cleanup, long-term stewardship poses a number of unique challenges that must be taken into account in estimating equipment and material needs.

For example, if there is no ongoing mission at the site, even the most routine and mundane maintenance equipment will need to be estimated and planned for. This includes estimating not only equipment and materials for routine activities but also unplanned contingencies. This will be particularly important for sites in remote locations where it may be difficult to procure equipment quickly. In these cases, it will be important to estimate not only what will be needed in the short-term but what kinds and amounts of materials will be required to have on hand in the event of an emergency (e.g., an estimate of the number of replacement pumps that should be on hand).

4.8.6 Equipment and Materials Management Policies/Procedures

DOE has many processes and procedures in place for planning, procuring and managing equipment and materials used at their sites (e.g., Life Cycle Asset Management (LCAM), the annual budget process, post-closure project baseline summary). In many cases, these processes can be modified to address long term stewardship needs. However, unlike operating sites or sites undergoing cleanup, long-term stewardship poses a number of unique challenges that must be addressed in procuring and managing equipment and materials similar to the discussion presented above in Section 11.3. Existing processes

and procedures need to be verified and modified to take into account factors such as access to equipment and materials, the availability of storage for equipment and materials, shipping and receiving procedures, etc.

Appendix E: Monitoring and Surveillance Activities

5.1 Monitoring Activities

5.1.1 Specific Monitoring Requirements

Monitoring may consist exclusively of ground-water and surface water monitoring; or it may include monitoring of air, soils, and biota. Specific monitoring activities will generally be identified in decision documents, permits and other regulatory requirements associated with the selected remedy.

The LTSP should describe the monitoring program by addressing:

- Specific monitoring requirements,
- Media that will be monitored (ground water, surface water, air),
- Objective(s) of monitoring (compliance, performance assessment),
- Analytes to be monitored,
- Standards that will apply (SDWA, RCRA, etc.),
- Methods of monitoring,
- Frequency of monitoring,
- Duration of the monitoring program,
- Basis for determining when monitoring will cease, and
- DOE commitment or obligation to intervene if applicable standards are exceeded.

For some sites, it may not be possible to provide a response in the LTSP for each of these issues. For example, at some sites monitoring may be a best management practice, a precautionary measure, without an imperative objective or specific requirement. If this is the case, the LTSP should include a forthright statement to this effect.

It is essential that the LTSP state explicitly the length or duration of monitoring to avoid creating the unrealistic expectation that monitoring is an open-ended activity that will go on forever. Eventually, there will be closure.

If monitoring is tied to performance, the LTSP should state this clearly and identify the performance objectives. If monitoring objectives, or the end of monitoring, are not defined when the LTSP is written, the LTSP may state that the monitoring activity, including the continuation of monitoring, will be reviewed after X years or every Xth year. This will avoid creating an unrealistic, open-ended monitoring obligation.

If ground water or other types of monitoring are not required at the site, the LTSP should state this and provide the rationale or justification for the no-monitoring requirement. In the case of ground water, the justification for no monitoring should include a summary of ground-water conditions that support the no-monitoring requirement. If the no-monitoring requirement is codified in a ROD or similar document, the LTSP should cite that document.

5.1.2 Media that will require monitoring

5.1.2.1 Groundwater

At most sites, water may be the most significant monitoring issue. The LTSP should include the following information:

- Summary of regional (background) ground-water hydrology and water quality,
- Current and historic use of ground water in the area,
- Summary of ground-water hydrology and water quality at the site,
- Description of subsurface stratigraphy and geologic structure as each bears on the hydrologic conditions at the site,
- Description of the degree and areal extent of contamination,
- List, location, and ownership of monitor wells and surface water sampling locations. Location maps or drawings will be useful for this purpose,
- For each well: a completion report that shows total depth, depth of screened interval, and formation or aquifer of completion,
- Monitoring frequency at each sampling location,
- Water quality indicators and contaminant analytes that will be monitored,
- The regulatory standard that will apply for each contaminant analyte (appropriate concentration limit or regulatory threshold for each analyte),
- Criteria to assess the progress or completion of the ground-water compliance strategy. This will be important if a ground-water compliance plan or performance objectives have been established for the site, and
- Reporting requirements.

In the summaries of regional and site ground-water conditions, a discussion of the historic, natural variability in the ground water will often be useful to evaluate current monitoring results.

If the site has a sampling and analysis plan that will apply during stewardship, this plan may already cover most of the information required for the LTSP. This plan should be cited in the LTSP and may, depending on length, be included as an attachment to the LTSP.

5.1.2.2 Surface Water [TBD]

5.1.2.3 Air [TBD]

5.1.2.4 Biota [TBD]

5.1.2.5 Soils [TBD]

5.1.2.6 Engineered Units [TBD]

5.1.3 Objectives for Monitoring Program

5.1.3.1 Detection [TBD]

5.1.3.2 Performance Assessment

The site-wide and portion-specific long-term stewardship plan should include performance metrics for remedies and associated long-term stewardship systems and activities that are elements of the plan. Performance metrics should be identified in the remedy conceptual model and other relevant documents by which the remedy and its associated long-term stewardship activities are selected and implemented.

Performance metrics an engineered control system component of the long-term stewardship strategy may include, for example, maximum target groundwater concentrations. A groundwater barrier system may be included as part of a remedy. Performance of the barrier is based on a maximum groundwater concentration of uranium in an groundwater aquifer of 30 pCi/l. For this case, the surveillance and monitoring plan for the remedy would include periodic monitoring of the uranium concentration in the groundwater downgradient of the barrier system., The long-term stewardship plan would include a requirement to conduct trends analysis of the groundwater monitoring data. In the event that data indicate that uranium concentrations in the groundwater are trending towards 30 pCi/l, this would indicate that unanticipated migration of groundwater across the barrier may be occurring. This in turn would indicate the need to review and reevaluate the effectiveness of the barrier system and implement corrective action procedures specified in the long-term stewardship plan.

Similarly, performance metrics should be established for institutional control components of the long-term stewardship strategy. For example, in addition to the groundwater barrier system, a remedy may also include institutional controls including restrictions on domestic groundwater use in the vicinity of the barrier system and restriction on land uses that would contribute to groundwater migration. These restrictions would be implemented through a permit program under which all land uses and groundwater uses in the vicinity of the barrier system are subject to permits issued by the local government. Surveillance and monitoring requirements for the institutional controls would include periodic scheduled inspections of land use and groundwater uses and periodic review of permit conditions. Performance metrics

for these institutional controls would include the requirement for completion of a specified number of land use and groundwater use inspections and permit reviews each year, and a positive result for each review and inspection. In the event that an inspection or review results in a negative result (i.e., noncompliance with permit conditions) this would indicate the need to review and reevaluate the effectiveness of the institutional control strategy and to implement corrective action procedures identified in the long-term stewardship plan.

Performance metrics should be developed for all engineered and institutional control systems and all long-term stewardship systems and activities that are part of the long-term stewardship strategy for the site or site portion. Performance metrics should identify the methodology for assessing performance, threshold criteria, corrective action requirements, and the roles and responsibilities for conducting performance assessment and corrective action activities.

Additional On-Line Resources:

Using Remedy Monitoring Plans To Ensure Remedy Effectiveness and Appropriate Modifications - RCRA/CERCLA Information Brief (DOE/EH-413 9809) Jul 98.
<http://tis.eh.doe.gov/oepa/guidance/cercla/rmp.pdf>

Insert excerpt on monitoring from Technical Guidance for the Long-term Monitoring of Natural Attenuation Remedies at Department of Energy Sites.

Developing Exit Strategies for Environmental Restoration Projects. [DOE/EH-413-0013]

5.1.3.3 Ambient Conditions

5.1.4 Parameters [TBD]

5.1.5 Standards that Apply [TBD]

5.1.6 Methods of Monitoring [TBD]

5.1.7 Locations [TBD]

5.1.8 Frequency [TBD]

5.1.9 Duration and Development of Ramp Down and/or Exit Strategy [TBD]

5.1.10 Expectations (Results of Performance Assessment) [TBD]

5.1.11 Quality Assurance/Quality Control

Pursuant to DOE Order 5700.6C, Quality Assurance, a Quality Assurance Plan will be prepared or applied to most sites. The LTSP should acknowledge this plan and its requirements by inclusion or citation in the LTSP.

5.1.12 Contingency Plans/Commitment to Intervene if Parameters are Exceeded [TBD]

5.1.13 Health and Safety

Health and safety requirements will be determined for the site based on the risks and exposures at the site. Health and safety requirements may vary widely among stewardship sites.

The LTSP should incorporate the health and safety requirements that apply to the site. If there is a separate health and safety plan, the plan can be attached or cited In the LTSP.

If risks and exposures do not warrant site-specific health and safety requirements, the LTSP should explain this circumstance and explain what general health and safety plan or requirement will govern site operations.

5.1.14 Data Interpretation [TBD]

5.1.15 Reporting and Archiving [TBD]

5.1.16 Threshold Criteria, Contingency Plans [TBD]

5.2 Portion-specific Monitoring Activities

Portion-specific monitoring is required wherever stewardship requirements have been broken down to subunits with their own monitoring requirements. In general, the division should be consistent with site descriptions. This section will describe all site portion-specific monitoring activities conducted for the long-term stewardship program, and may reference existing portion-specific monitoring plans and relevant site-specific documents. This plan will describe specific monitoring practices and procedures for:

- a) implementation of engineered controls (the long-term stewardship program itself (e.g., as described in outline Sections);
- b) demonstration of compliance with DOE long-term stewardship requirements and stakeholder commitments;
- c) evaluation of long-term effectiveness and permanence of engineered controls;
- d) DOE external oversight of long-term stewardship activities conducted by other entities (e.g., private landowners); and
- e) evaluation of the conformance of the overall long-term stewardship program with the long-term stewardship plan

These elements may be described in separate sections of or in appendices to the long-term stewardship plan.

- Media-specific monitoring (e.g., groundwater, soils monitoring)
- System-specific surveillance (e.g., permit program inspections)
- Ecological resources monitoring
- Remedy performance/effectiveness

Additional On-Line Resources:

EPA Draft Comprehensive Five-Year Review Guidance - United States Government Memorandum 11/24/99. <http://tis.eh.doe.gov/oepa/guidance/cercla/5yrmemo.pdf>

Final Directive On the Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites - United States Government Memorandum 6/9/99. <http://tis.eh.doe.gov/oepa/guidance/rcra/mna-memo2.pdf>

Monitored Natural Attenuation in Environmental Restoration - United States Government Memorandum 2/17/99. <http://tis.eh.doe.gov/oepa/guidance/rcra/mna-memo.pdf>

Monitored Natural Attenuation in Environmental Restoration - United States Government Memorandum 2/17/99. <http://tis.eh.doe.gov/oepa/guidance/rcra/mna-memo.pdf>

RCRA Ground Water Assessment Plans and Annual Ground Water Quality Assessment Reports at Interim Status Facilities - RCRA Information Brief (EH-413-069/0396) Mar 96. <http://tis.eh.doe.gov/oepa/guidance/gw/waterreg.pdf>

5.3 Surveillance Activities

Some form of surveillance (inspection) will be required at all stewardship sites. This rule is so universal, that if inspections are not required, it will be incumbent on the LTSP to explain why.

Visual inspections by qualified inspectors will be required even if certain monitoring activities will be achieved by remote sensing.

The LTSP should state :

- Types of inspection,
- Objectives of the inspection(s), whether general or specific,
- Frequency of inspection,
- Qualifications of inspectors,
- Procedures,
- Health and safety requirements, and
- Reporting requirements.

5.3.1 Types of Inspection

The types of inspection will be site specific. Low-risk sites with effective institutional controls may require only an annual walkover or *general* inspection. Monthly, or even weekly, inspections may be required if risks are sufficiently high.

The LTSP may require *follow-up* inspections if a problem is discovered during a general inspection, or *emergency* inspections if a serious problem, such as a major storm or human intrusion is reported by the public or an outside agency. (See Section 2.13, Emergency Notification.)

Consideration should be given to credible worst-case scenarios when determining the kinds of inspections and responses that need to be addressed in the LTSP.

5.3.2 Objectives of Inspection Activities

The objectives of a site inspection are:

- Confirmation of site integrity,
- Discovery of sudden, unexpected changes,
- Monitoring of slow, progressive changes that may only become apparent over time, and
- Documentation.

Inspectors should be familiar with baseline site conditions and use them as a reference for discovery and evaluation of changes that may have occurred.

5.3.3 Frequency

The minimal requirement for many sites will be an annual site inspection. If more frequent inspections – or different kinds of inspection – are required, the LTSP should state the requirement and give the reason for more frequent inspections.

If inspections are desirable (or required) during certain seasons or times of the year, the LTSP should state and explain this requirement.

5.3.4 Qualification of Inspectors

For most general, routine inspections, inspectors will usually be engineers or scientists with appropriate backgrounds and experience. If conditions at the site require technical specialists with specific training or other qualification, the LTSP should, to the extent possible, identify the specialists that may be required and the role of each on the inspection team.

Specialists may also be required for follow-up or emergency inspections.

To meet health and safety requirements and quality assurance objectives, an inspection team will normally comprise a minimum of two inspectors.

5.3.5 Procedures

To ensure a thorough inspection, the LTSP may establish specific procedures for inspectors to:

- Prepare for the inspection,
- Conduct the inspection,
- Close-out the inspection, and
- File inspection reports.

If inspection procedures are formal or complex, they may be attached to the LTSP in an appendix. If procedures are in a separate procedures document, the document should be cited in the LTSP.

The inspection procedure may incorporate inspection check list(s).

If procedures are highly specific, detailed, and prescriptive, there should also be provision for inspectors to make general observations not anticipated by the inspection procedure or check list. This will ensure that problems unanticipated by the procedure or check list do not go unnoticed.

If agreements are in place for tribes or other stakeholders to participate in inspections or to receive reports of inspection, this requirement should be in the LTSP.

Procedures to prepare for the inspection may include the following tasks:

- Review specific plans (including the LTSP), drawings, previous inspection reports, and maintenance reports,
- Update the inspection check list to incorporate new information,
- Notify regulators, stakeholders, and other site personnel per agreements or courtesy, and
- Initiate access or entry procedures.

Procedures for conduct of the inspection may include:

- Use of procedure(s) and check lists identified in the LTSP to ensure a thorough inspection,
- Implement health and safety procedures, and

- Use of photography, forms, drawings, or notebooks to records observations.

Procedures to close-out the inspection may include the following tasks:

- Submit inspection report,
- Revise inspection check list to incorporate new information,
- Notify affected parties of completion, and
- Preserve inspection documents, notebooks, photographs, and drawings as records.

Inspection checklist. An inspection checklist may be useful to ensure thoroughness of the inspection. In this respect, a checklist is a useful quality assurance tool. A checklist may incorporate the following:

- Specific features to be inspected, measured, or photographed,
- The physical condition of a disposal cell or other containment system,
- Human, animal, or plant activities that warrant attention,
- Adequacy of security features and procedures,
- Evidence of erosion, slope instability, or flood and storm damage, and
- Data recording requirements (forms to be filled out).

If monitoring is to be part of the inspection, the check list may include the monitoring activity as well.

Check lists may need to be revised from time to time, possibly after each inspection, to incorporate new information. The LTSP should provide or permit this revision so that the check list does not become obsolete.

5.3.6 Health and Safety Requirements

Site inspections should be conducted in compliance with applicable health and safety requirements. If these requirements are in response to specific exposures at the site, the LTSP should identify the exposure or risk and include the appropriate health and safety requirement. An option may be to cite a separate health and safety plan that covers site operations during stewardship. (See Section, Health and Safety.)

5.3.7 Reporting Requirements

Reporting requirements may be dictated by regulations and agreements, or established by best management practice. The LTSP should be specific about these requirements: what reports are required; how and to whom reports are to be submitted.

Different or additional reporting requirements may apply when unusual damage or disturbance is discovered during an inspection. The LTSP should identify these reporting requirements if they have been established for the site.

The LTSP should incorporate, as standard procedure, maintenance of all reports and associated documents (records) in a permanent site records file or repository. (See Section, Records.)

Reference EPA 5-year Review Guidance; DOE Draft 5-year Review Guidance
(Anticipated Release in April/May Timeframe)

5.3.8 Emergency Response and Corrective Action [TBD]

5.3.9 Quality Assurance [TBD]

5.4 Portion-specific Surveillance Activities

[TBD]

Appendix F: Technology Review

6.1 Strategy Evaluation Policy and Procedure

The strategy and technical approach to LTS must be reviewed as a part of the Department's five-year review policy. The LTSP should indicate how that obligation will be met and how the results will be implemented as appropriate.

Additional Resource:

The Low-Level Waste Management Program Research and Development Implementation Plan. (U.S. Department of Energy Office of Environmental Management April 8, 1999.) was prepared in response to DNFSB Recommendation 94-2 to ensure a productive interface between the low level waste management program and the research and development community. The approach is summarized in the following, and may serve as a model for a similar interface related to other stewardship activities.

The purpose of this document is to describe the Department's complex-wide implementation plan contained in the "*Complex-Wide Strategy for Maintenance of Department of Energy Low-Level Waste Disposal Facility Performance Assessments and Composite Analyses.*" This implementation plan addresses research and development needs relating to the long-term protection of the public and the environment from low-level waste disposal, and describes how these needs will be met. Research and development, as used in this document, includes traditional research and development activities, such as basic scientific research and development of new technologies. The term also includes studies to address data gaps and technical information needs, as well as collection of data through use of monitoring and during routine operations. The primary focus of this plan is research and development aimed at reducing the uncertainty of evaluations of the long-term safety of disposed low-level waste; another focus is to seek out improved technology to enhance defense-in-depth for long-term safety of disposed low-level waste.

Section 2.0 presents an overview of the performance assessment and composite analysis process and the activities conducted by the Office of Science and Technology. Section 3.0 describes the general strategy used to identify and prioritize research and development needs related to low-level waste disposal and selection of an approach to meet these needs. Section 4.0 describes the roles of organizations that have responsibilities for implementing this plan, including the field organizations, Office of Waste Management and Low-Level and Mixed Low-Level Waste Center of Excellence, Low-Level Waste Disposal Facility Federal Review Group, and the Office of Science and Technology. Section 5.0 provides deliverables and dates for completing these deliverables to ensure that the research and development needs are met. The document will be available from Defense Nuclear Facilities Safety Board (DNFSB) on the Office of Long-Term Stewardship website: <http://lts.apps.em.doe.gov/>.

6.2 Research and Development Needs and Activities

One element of the five-year review is an assessment of whether the most cost-effective technology is being employed when considering life-cycle implications. In concert with the obligation to evaluate cost, sites should include within the LTS plan a strategy for identifying science and technology needs and implementing technologies when development fills those needs.

DOE is required to conduct Performance Assessment/Composite Analysis (PA/CA) for low-level radioactive waste disposal facilities, and this approach may be applicable to developing a process for identifying science and technology needs and incorporating advances in science and technology into the site-wide and portion-specific long-term stewardship strategy.

Uncertainty matrices and conceptual models for remedies may identify areas where uncertainties could be addressed by science and technology advances, and could be used to prioritize areas for research and development for long-term stewardship and re-remediation needs. Also, the PA/CA process includes sensitivity analysis that identifies the parameters contributing most to the long-term risk posed by the remedy. Uncertainties can result from limited knowledge of site characteristics, understanding of controlling phenomena, or other factors. Results of the PA/CA and specifically the sensitivity analysis can be used to focus research and development on those areas that would result in the greatest reduction in risk and/or uncertainty. The PA/CA and sensitivity analysis are required to be updated as new information becomes available. This requirement provides a means to incorporate research and development results into the PA/CA and also to identify new research and development needs

Science and technology needs assessment for long-term stewardship may be coordinated with government and non-government science and technology research and development entities at the site level or on a complex-wide basis. Large sites with continuing missions may conduct their own needs assessment while smaller sites or sites without future mission may depend upon a complex-wide organization for science and technology needs assessment for long-term stewardship.

6.3 Technology Integration/Deployment

It is anticipated that science and technology needs across long-term stewardship sites will be similar, because the remedies, end states, residual hazards, and long-term stewardship systems and activities are to some extent similar across sites.

Appendix G: Cost and Schedule

Stewardship will be a long-term activity at many if not most sites. Initial and forward (out-year) cost estimates, along with preliminary schedules for anticipated stewardship activities and deliverables, should be developed before stewardship begins and then reviewed and updated yearly, as part of the DOE's budgeting cycle.

A budget plan, long-range management plan, or similar document that incorporates cost and schedule information, should be developed for each site. This plan should identify the office responsible for funding and should describe projects costs and funding issues to assure sufficient funding for routine as well as intermittent costs associated with stewardship. In addition to operating costs, the budget plan should also identify such costs as payments in lieu of taxes.

A scheduling document, perhaps part of a long-range management plan or other planning document, should also be developed for the site. The schedule should begin with the starting date of stewardship and end with the projected completion or final site disposition date, if known (See Section 2.17). It also should include planning schedules for annual, routine stewardship activities, such as inspections and monitoring.

A statement in the planning document to the effect that emergencies and disasters, such as extreme weather, are not schedulable; but that DOE will nevertheless respond to these exceptional events to limit exposures and protect public health, safety, and the environment, may be advisable.

Personnel planning for stewardship may find that the LTSP is not ideal for cost and detailed scheduling information. The LTSP will likely be developed and implemented with the participation, if not the outright concurrence or approval authority of outside agencies and groups. It is likely that the revision of the LTSP will also involve these same agencies and groups. Therefore, the LTSP should be regarded as a relatively permanent document. Annual or frequent revision of the LTSP to incorporate cost and schedule changes may be impractical.

7.1 Schedule for Long-term Stewardship Activities

Start date/end date (known or estimated, for overall program and for specific long-term stewardship activities conducted by DOE and others at site, portion of site, or off site area)

Milestones (for overall program and specific activities at site, portion of site, or off site area)

7.2 Cost Estimating, Funding, and Financial Management

The purpose of this section is to describe policies and procedures for cost estimating, funding, and financial management of long-term stewardship activities for each site portion. Cost estimation, funding, and financial management for site-wide and integrating activities are described in Section 4.0. Long-term stewardship activities at a site may not necessarily be funded by a single entity or mechanism; different portions of the site may have different

funding mechanisms. Funding sources, financial management and costs will be described by activity for each site portion for activities conducted by DOE and by other entities.

7.2.1 Funding sources

- Current
- Future

7.2.2 Financial Management

- Contracts and financial management
- Financial data collection and reporting requirements
- Audits and financial oversight
- Financial contingency planning

7.2.3 Cost Estimation

Scope of cost estimate (direct long-term stewardship activities, support activities [e.g., utilities], other activities)

Budget and estimated life cycle cost (capital cost, operating/maintenance costs, refurbishment and replacement costs, surveillance and monitoring costs, contingency costs, modeling and other risk assessment costs, etc.)

Cost data collection (collection of actual long-term stewardship activity cost data for use in refining long-term stewardship cost estimates)

7.3 Schedule and Cost for Portions of Site

[TBD]

Appendix H: Other Resources

This section will contain web addresses and references to completed plans that can be used as models or examples. Examples will include example LTS plans or segments of the plans developed for other agencies, etc.